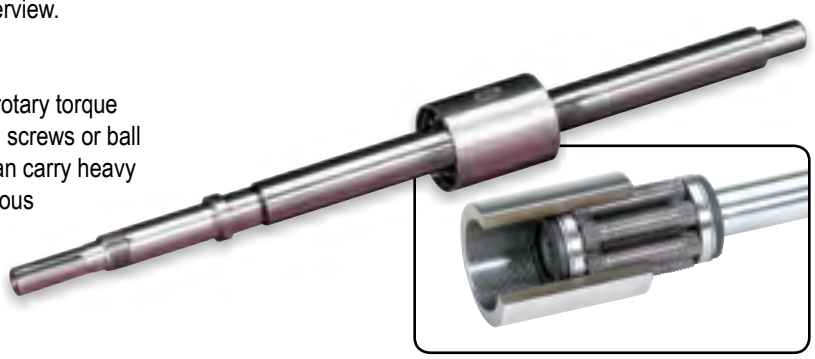
The Advantages of Roller Screw Technology

Designers have five basic choices when it comes to achieving controlled linear motion. The table on page 3 gives you a quick overview of the general advantages that are associated with each. Because the roller screw technology common to all Exlar linear actuators might not be familiar to everyone using this catalog, allow us to present a general overview.

The difference is in the way the roller screw is designed to transmit forces. Multiple threaded helical rollers are assembled in a planetary arrangement around a threaded shaft (shown below) which converts the motor's rotary motion into linear movement of the shaft or nut.

Roller Screw Basics

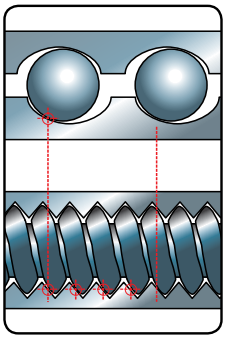
A roller screw is a mechanism for converting rotary torque into linear motion in a similar manner to acme screws or ball screws. Unlike those devices, roller screws can carry heavy loads for thousands of hours in the most arduous conditions. This makes roller screws the ideal choice for demanding, continuous-duty applications.



Exlar Roller Screws vs Hydraulics & Pneumatics

In applications where high loads are anticipated or faster cycling is desired, Exlar's roller screw actuators provide an attractive alternative to the hydraulic or pneumatic options. With their vastly simplified controls, electro-mechanical units using roller screws have major advantages.

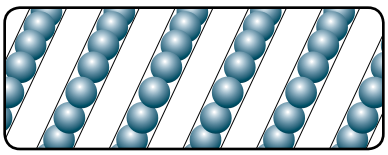
- Eliminates the need for a complex support system of valves, pumps, filters and sensors.
- Requires much less space.
- Extends working life.
- Minimizes maintenance.
- Eliminates hydraulic fluid leaks.
- Reduces noise levels.
- Allows the flexibility of computer programmed positioning.



Exlar Roller Screws vs Ball Screws Performance

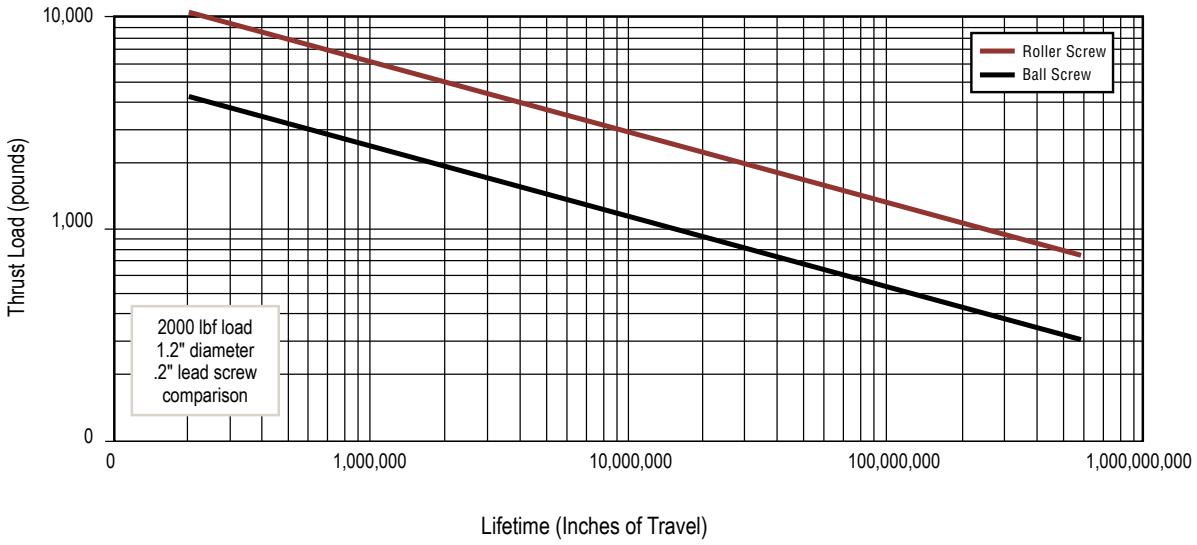
Loads and Stiffness: Due to design factors, the number of contact points in a ball screw is limited by the ball size. Exlar's planetary roller screw designs provide many more contact points than possible on comparably sized ball screws. Since the number of contact points is greater, roller screws have greater load carrying capacities, plus improved stiffness. Plus an Exlar roller screw actuator takes up much less space to meet the designer's specified load rating.

Travel Life: As you would expect, with their higher load capacities, roller screws deliver major advantages in working life. Usually measured in "Inches of Travel," the relative travel lives for roller and ball screws are displayed on the graph on page 3. As shown, in a 2,000 lb. average load application applied to a 1.2 inch screw diameter with a 0.2 inch lead, the roller screw will have an expected service life that is 15 times greater than that of the ball screw.



Speeds: Typical ball screw speeds are limited to 2000 rpm and less, due to the interaction of the balls colliding with each other as the race rotates. In contrast, the rollers in a roller screw are fixed in planetary fashion by journals at the ends of the nut and therefore do not have this limitation. Hence, roller screws can work at 5000 rpm and higher, producing comparably higher linear travel rates.

Lifetime Comparison (Roller vs Ball Screws)



Roller Screw vs. Other Linear Motion Technologies

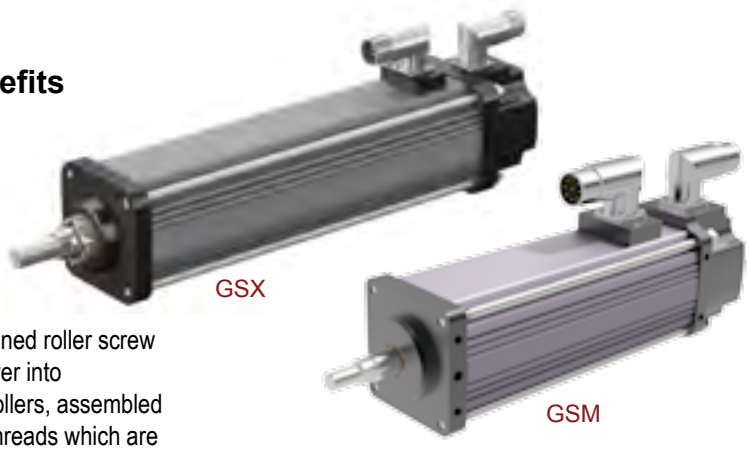
(Used in electronic positioning applications)

	Exlar Roller Screws	Acme Screws	Ball Screws	Hydraulic Cylinders	Pneumatic Cylinders
Load ratings	Very High	High	High	Very High	Low
Lifetime	Very long, many times greater than ball screw	Very low, due to high friction & wear	Moderate	Can be long with proper maintenance	Can be long with proper maintenance
Speed	Very high	Low	Moderate	Moderate	Very high
Acceleration	Very high	Low	Moderate	Very high	Very high
Electronic Positioning	Easy	Moderate	Easy	Difficult	Very Difficult
Stiffness	Very high	Very high	Moderate	Very high	Very low
Shock Loads	High	Very high	Moderate	Very high	High
Relative Space Requirements	Minimum	Moderate	Moderate	High	High
Friction	Low	High	Low	High	Moderate
Efficiency	>90%	approx 40%	>90%	<50%	<50%
Installation	Compatible with standard servo electronic controls	User may have to engineer a motion/ actuator interface	Compatible with standard servo electronic controls	Complex, requires servo-valves, high pressure plumbing, filtering, pumps linear positioning & sensing	Very complex requires servo-valves, plumbing, filtering, compressors linear positioning & sensing
Maintenance	Very low	High, due to poor wear characteristics	Moderate	Very high	High
Environmental	Minimum	Minimum	Minimum	Hydraulic fluid leaks & disposal	High noise levels

GS Series

GSX and GSM Common Benefits

The GS Series linear actuators by Exlar offers you two grades of actuator to provide cost effective options in order to meet your application's requirements. View the chart below to compare the GSX and GSM models.



All GS Series actuators use a specially designed roller screw mechanism for converting electric motor power into linear motion within the actuator. Planetary rollers, assembled around the actuator's extending rod, follow threads which are precisely machined on the inside surface of the actuator's hollow armature. Linear motion is produced in precise synchronization with the armature rotation. Because roller screw mechanism has an inherently larger cumulative contact surface, these actuators have a much longer working life, and can handle heavier loads at higher speeds than is possible from a similarly sized ball screw system.

Exlar's T-LAM segmented lamination stator technology delivers higher continuous motor torque than in traditionally wound motors. T-LAM technology consists of stator segments, each containing individual phase wiring for maximum motor performance. The improved efficiencies of the GSX Series are a result of the limited heat generation qualities inherent in the segmented stator design (see diagram). The elimination of end turns in the stator, and the use of thermally conductive potting removes the parts most susceptible to failure in a traditional stator. Other design advantages include:

- Neodymium-iron-boron magnets provide high flux density and maximum motor torque.
- Thermally conductive potting of the entire stator provides increased heat dissipation and protection from contamination in oil-cooled units.
- Each stator segment contains individual phase wiring. External winding of individual segments provides maximum slot fill for maximum motor performance.
- Class 180 H insulation systems compliant with UL requirements.
- UL recognized component.
- CE compliant.

Integrated Motor and Actuator in One Compact Unit

With other actuator technologies, customers are usually responsible for engineering the linear motion system. This process usually includes purchasing the motor, gear reducer, timing belt, mounting hardware, flexible couplings, etc. separately. Then these components must be assembled to perform properly for a given application.

GS Series actuators eliminate all this systems engineering. These units are single, fully integrated component packages that are much smaller than traditional rotary-to-linear conversion mechanisms.

Designed for Closed Loop Servo Systems

Their brushless servo design means GS Series units can be used in advanced closed-loop servo systems when velocity regulation and position control are required. Position feedback can be delivered in a number of different forms. These include resolvers, encoders, or internally mounted linear position feedback sensors.

GSX and GSM Differences	GSX (pg 5)	GSM (pg 36)
Frame Sizes	**20, 30, 40, 50, 60**	**20, 30, 40**
Roller Screw Option	High Capacity	Standard Capacity
Ingress Protection	IP65S	IP54S (IP65S optional)
Motor Stacks	1, 2, 3	1, 2
Life vs. Ball Screw	15X	2 to 5X
Oil Cooling Option	Yes	No
Rated Force (lbf)	92 - 15,000	92 - 3,966
Speeds (ips)	5 - 40	5 - 37.5
Backlash (in)	0.004	0.008

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GSX SERIES

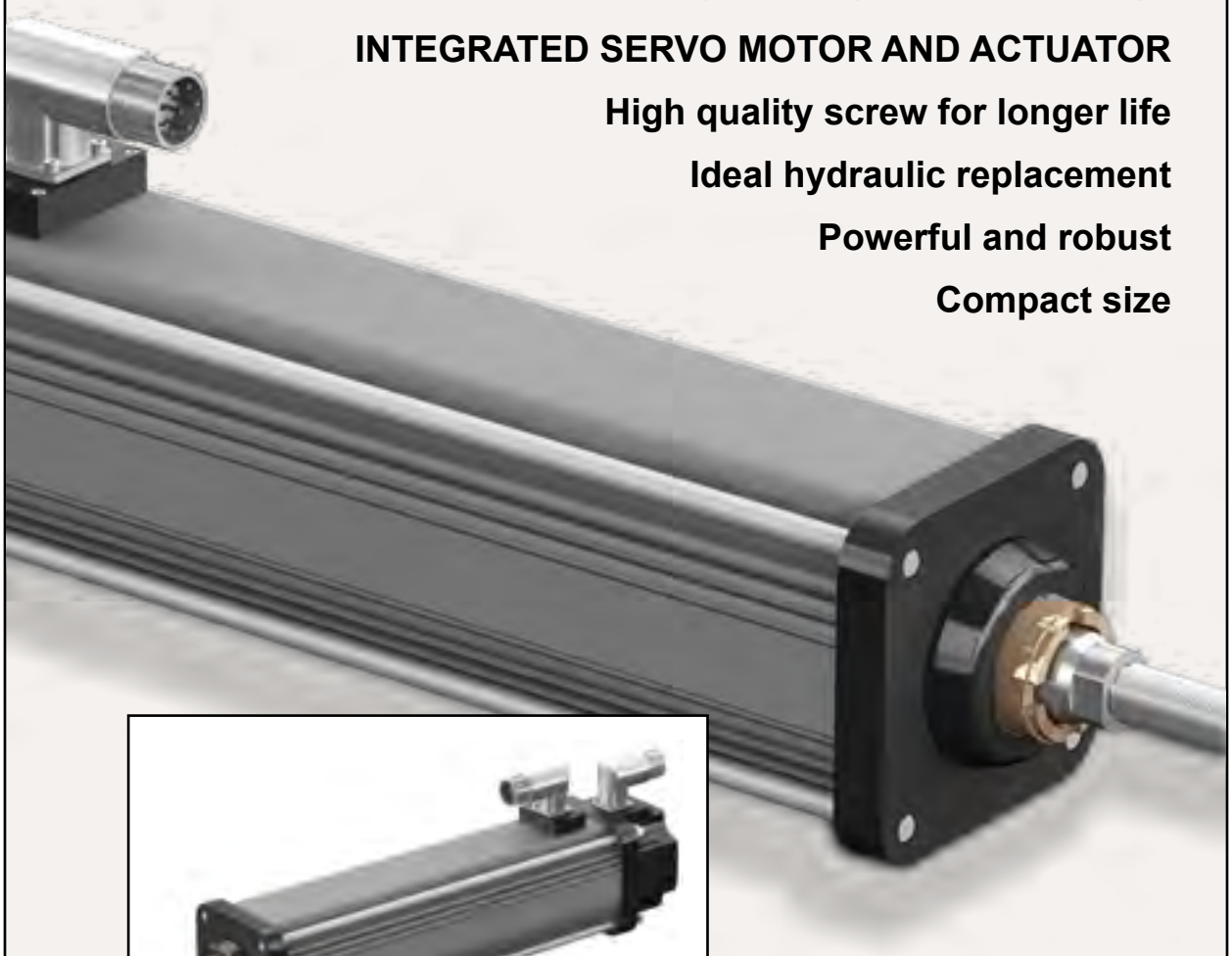
INTEGRATED SERVO MOTOR AND ACTUATOR

High quality screw for longer life

Ideal hydraulic replacement

Powerful and robust

Compact size



GSX Series

High Capacity Integrated Motor/Actuator

Description

For applications that require long life and continuous duty, even in harsh environments, the GSX Series actuator offers a robust solution. The life of these actuators can exceed that of a ball screw actuator by 15 times, all while delivering high speeds and high forces.

Sealed for Long Life with Minimum Maintenance

GSX Series actuators have strong advantages wherever outside contaminants are an issue. In most rotary-to-linear devices, critical mechanisms are exposed to the environment. Thus, these actuators must be frequently inspected, cleaned and lubricated.

In contrast, the converting components in all Exlar GSX units are mounted within sealed motor housing. With a simple bushing and seal on the smooth extending rod, abrasive particles or other contaminants are prevented from reaching the actuator's critical mechanisms. This assures trouble-free operation even in the most harsh environments.

Similarly, lubrication requirements are minimal. GSX actuators can be lubricated with either grease or recirculated oil. Grease lubricated units will run up to 10,000 hours without regreasing. Recirculated oil systems eliminate this type of maintenance altogether. A GSX Series actuator with a properly operating recirculating oil system will operate indefinitely, without any other lubrication requirements.

Feature	Standard	Optional
External anti-rotate mechanism	No	Yes
Internal Anti-rotate Mechanism	No	Yes
Pre-loaded follower	No	Yes
Electric brake	No	Yes
External End Switches	No	Yes
Connectors	Right Angle, Rotatable	Custom Connectors
Mounting Style	Extended Tie Rods, Side Tapped Mounting Holes, Trunnion, Rear Clevis, Front or Rear Flange	Custom Mountings
Rod End	Male or Female: U.S. Standard or Metric	Specials Available To Meet OEM Requirements
Lubrication	Greased, Oil Connection Ports are Built-in for Customer Supplied Recirculated Oil Lubrication	Specials Available To Meet OEM Requirements
Primary Feedback	Standard Encoders or Resolvers to Meet Most Amplifier Requirements	Custom Feedback

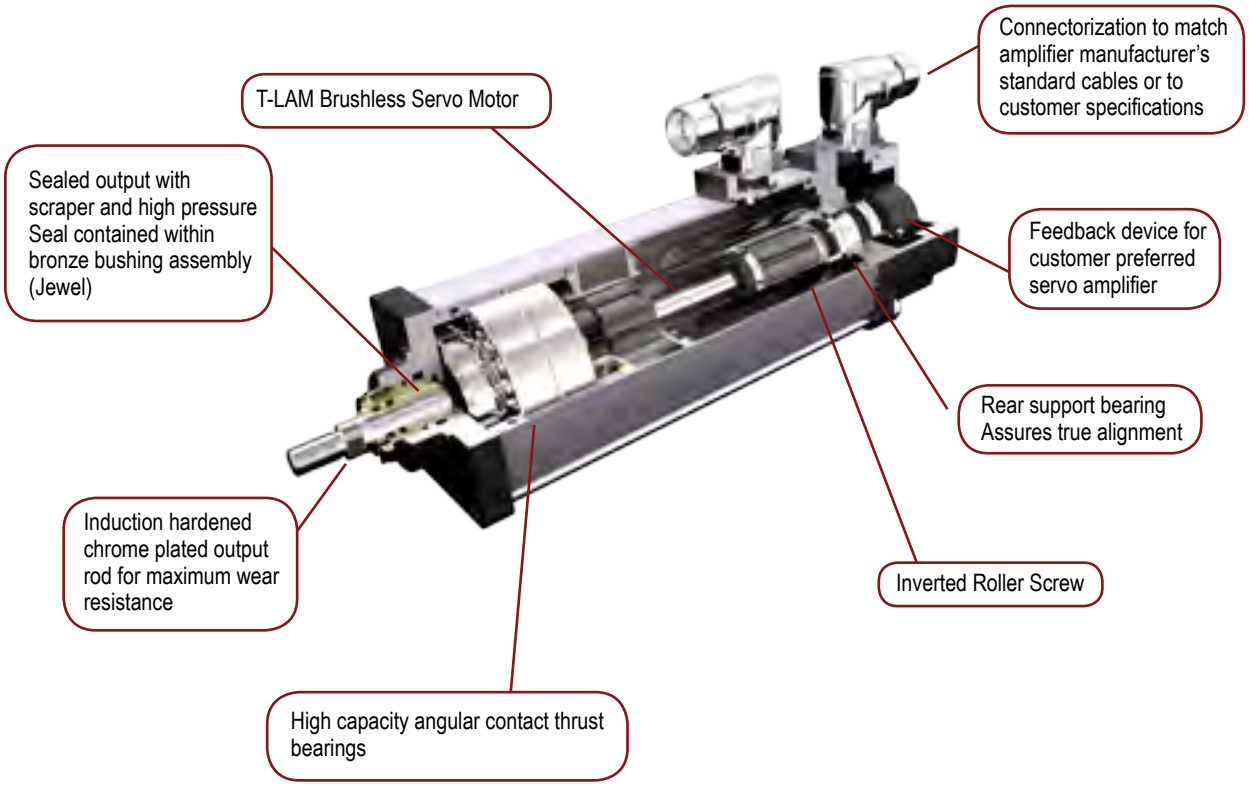
Technical Characteristics	
Frame Sizes in (mm)	2 (60), 3 (80), 4 (100), 5.5 (140), 7 (180)
Screw Leads in (mm)	0.1 (2), 0.2 (5), 0.25 (6), 0.4 (10), 0.5 (13), 0.75 (19), 1 (25)
Standard Stroke Lengths	3 (75), 4 (100), 6 (150), 8 (200), 10 (250), 12 (300), 14 (350), 18 (450)
Force Range	103 to 11,528 lbf (458 to 51 kN)
Maximum Speed	up to 37.5 in/sec (952 mm/s)

Operating Conditions and Usage		
Accuracy:		
Screw Lead Error	in/ft	0.001
Screw Travel Variation	in	0.0012
Screw Lead Backlash	in	0.004 maximum
Ambient Conditions:		
Standard Ambient Temperature	°C	0 to 65
Extended Ambient Temperature*	°C	-30 to 65
Storage Temperature	°C	-40 to 85
IP Rating		IP65S
Vibration**		3.5 grms; 5 to 520 hz

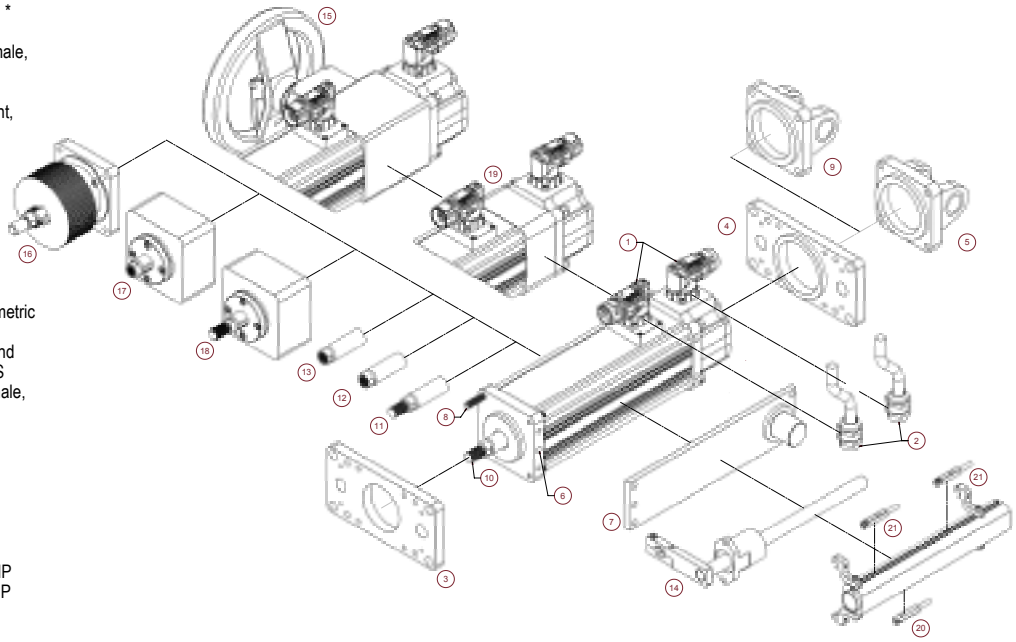
* Consult Exlar for extended temperature operations
** Resolver feedback

Ratings at 25°C, operation over 25°C requires de-rating.

Product Features



1 -Exlar standard M23 style and manufacturer's connector
2 -Embedded leads 3 ft. standard *
3 -Front flange and rear flange*
4 -Male metric thread SS and female, metric thread
5 -Rear clevis
6 -Side mount*, double side mount, metric side mount*, and metric double side mount
7 -Side trunnion and metric side trunnion
8 -Extended tie rods and metric extended tie rods
9 -Metric rear clevis
10 -Male, US standard thread and male, US standard thread SS
11 -Male, metric thread and male metric thread SS
12 -Female, US standard thread and female, US standard thread SS
13 -Female, metric thread and female, metric thread SS
14 -External anti-rotate
15 -Manual drive, handwheel with interlock switch
16 -Protective bellows
17 -Splined main rod - Female
18 -Splined main rod - Male
19 -Rear brake
20 -External limit switch - N.O., PNP
21 -External limit switch - N.C., PNP



*Consult Factory

Industries and Applications:

Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement

Automotive
- Dispensing
- Welding
- Pressing
- Riveting / Fastening / Joining

Food Processing
- Sealing
- Dispensing
- Forming
- Pick and Place Systems
- Fillers
- Cutting / Slicing / Cubing

Sawmill/Forestry
- Saw Positioning
- Fence Positioning
- Ventilation Control Systems

Machining
- Material Cutting
- Broaching
- Metal Forming
- Tube Bending
- Stamping

Entertainment / Simulation
- Animatronics
- Training Simulators
- Ride Automation

Medical Equipment
- Volumetric Pumps
- Patient Positioning

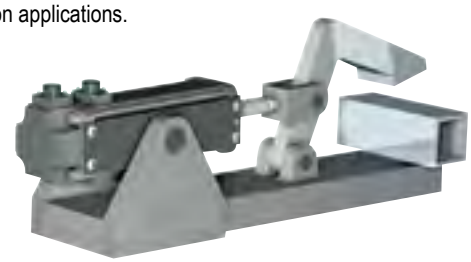
Plastics
- Die Cutters
- Part Eject
- Core Pull
- Formers

Material Handling
- Nip Roll Positioning
- Tension Control
- Web Guidance
- Wire Winding

Test
- Fatigue Testing
- Load Simulation Testing

Repeatable force, reliable positioning accuracy, and flexible control make GSX actuators a perfect fit for assembly presses or test stands.

Repeatable force control plus positioning accuracy extends the life of costly tools when Exlar linear actuators are used for precision applications.



Mechanical Specifications

GSX20

Model No. (Motor Stacks)		1 Stack			2 Stack			3 Stack	
Screw Lead Designator		**01**	**02**	**04**	**01**	**02**	**04**	**02**	**04**
Screw Lead	in	0.1	0.2	0.4	0.1	0.2	0.4	0.2	0.4
	mm	2.54	5.08	10.16	2.54	5.08	10.16	5.08	10.16
Continuous Force *(Motor Limited)*	lbf	367	195	103	578	307	163	409	216
	N	1632	867	459	2571	1366	723	1817	962
Max Velocity	in/sec	8.3	16.8	33.3	8.3	16.8	33.3	16.8	33.3
	mm/sec	211.7	423.3	846.7	211.7	423.3	846.7	423.3	846.7
Friction Torque *(standard screw)*	in-lbf	1.0			1.1			1.1	
	N-m	0.11			0.12			0.12	
Friction Torque *(preloaded screw)*	in-lbf	2.3			2.3			2.3	
	N-m	0.25			0.26			0.26	
Back Drive Force[1]	lbf	110	60	30	110	60	30	60	30
	N	490	270	135	490	270	135	270	135
Min Stroke	in	3			3			6	
	mm	75			75			150	
Max Stroke	in	12			12			12	
	mm	300			300			300	
C_a (Dynamic Load Rating)	lbf	2075	1540	1230	2075	1540	1230	1540	1230
	N	9230	6850	5471	9230	6850	5471	6850	5471
Inertia *(zero stroke)*	lb-in-s^2	0.0007758			0.0008600			0.0009442	
	Kg-m^2	0.0000008766			0.0000009717			0.000001067	
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.00004667							
	Kg-m^2/mm	0.00000005273							
Weight *(zero stroke)*	lb	4.5			5.0			5.5	
	Kg	2.04			2.27			2.49	
Weight Adder *(per unit of stroke)*	lb	0.5							
	Kg	0.23							

GSX30

Model No. (Motor Stacks)		1 Stack			2 Stack			3 Stack	
Screw Lead Designator		**01**	**02**	**05**	**01**	**02**	**05**	**02**	**05**
Screw Lead	in	0.1	0.2	0.5	0.1	0.2	0.5	0.2	0.5
	mm	2.54	5.08	12.7	2.54	5.08	12.7	5.08	12.7
Continuous Force *(Motor Limited)*	lbf	792	449	190	1277	724	306	1020	432
	N	3521	1995	845	5680	3219	1363	4537	1922
Max Velocity	in/sec	5.0	10.0	25.0	5.0	10.0	25.0	10.0	25.0
	mm/sec	127.0	254.0	635.0	127.0	254.0	635.0	254.0	635.0
Friction Torque *(standard screw)*	in-lbf	1.5			1.7			1.9	
	N-m	0.17			0.19			0.21	
Friction Torque *(preloaded screw)*	in-lbf	3.3			3.5			3.7	
	N-m	0.37			0.39			0.41	
Back Drive Force[1]	lbf	180	80	40	180	80	40	80	40
	N	800	360	180	800	360	180	360	180
Min Stroke	in	3			3			5.9	
	mm	75			75			150	
Max Stroke	in	18			18			18	
	mm	450			450			450	
C_a (Dynamic Load Rating)	lbf	5516	5800	4900	5516	5800	4900	5800	4900
	N	24536	25798	21795	24536	25798	21795	25798	21795
Inertia *(zero stroke)*	lb-in-s^2	0.002655			0.002829			0.003003	
	Kg-m^2	0.000003000			0.000003196			0.0000033963	
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.0001424							
	Kg-m^2/mm	0.0000001609							
Weight *(zero stroke)*	lb	6.5			7.65			8.8	
	Kg	2.95			3.47			3.99	
Weight Adder *(per unit of stroke)*	lb	1.1							
	Kg	0.50							

[1] Back drive force is nominal value only. Operating conditions can cause wide variations in back drive force. Exlar cannot assure that an actuator will or will not back drive.

*See definitions on page 11

GSX40

Model No. (Motor Stacks)		1 Stack				2 Stack				3 Stack		
Screw Lead Designator		**01**	**02**	**05**	**08**	**01**	**02**	**05**	**08**	**02**	**05**	**08**
Screw Lead	in	0.1	0.2	0.5	0.75	0.1	0.2	0.5	0.75	0.2	0.5	0.75
	mm	2.54	5.08	12.7	19.05	2.54	5.08	12.7	19.05	5.08	12.7	19.05
Continuous Force *(Motor Limited)*	lbf	2089	1194	537	358	3457	1975	889	593	2687	1209	806
	N	9293	5310	2390	1593	15377	8787	3954	2636	11950	5378	3585
Max Velocity	in/sec	5.0	10.0	25.0	37.5	5.0	10.0	25.0	37.5	10.0	25.0	37.5
	mm/sec	127.0	254.0	635.0	953.0	127.0	254.0	635.0	953.0	254.0	635.0	953.0
Friction Torque *(standard screw)*	in-lbf	2.7				3.0				3.5		
	N-m	0.31				0.34				0.40		
Friction Torque *(preloaded screw)*	in-lbf	7.2				7.5				8.0		
	N-m	0.82				0.85				0.91		
Back Drive Force[1]	lbf	380	150	60	50	380	150	60	50	150	60	50
	N	1700	670	270	220	1700	670	270	220	670	270	220
Min Stroke	in	4				6				8		
	mm	100				150				200		
Max Stroke	in	18			12	18			12	18		12
	mm	450				450				450		300
C_a (Dynamic Load Rating)	lbf	7900	8300	7030	6335	7900	8300	7030	6335	8300	7030	6335
	N	35141	36920	31271	28179	35141	36920	31271	28179	36920	31271	28179
Inertia *(zero stroke)*	lb-in-s^2	0.01132				0.01232				0.01332		
	Kg-m^2	0.000012790				0.00001392				0.00001505		
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.0005640										
	Kg-m^2/mm	0.0000006372										
Weight *(zero stroke)*	lb	8.0				11.3				14.6		
	Kg	3.63				5.13				6.62		
Weight Adder *(per unit of stroke)*	lb	2.0										
	Kg	0.91										

GSX50

Model No. (Motor Stacks)		1 Stack				2 Stack				3 Stack		
Screw Lead Designator		**01**	**02**	**05**	**10**	**01**	**02**	**05**	**10**	**02**	**05**	**10**
Screw Lead	in	0.1	0.2	0.5	1.0	0.1	0.2	0.5	1.0	0.2	0.5	1.0
	mm	2.54	5.08	12.7	25.4	2.54	5.08	12.7	25.4	5.08	12.7	25.4
Continuous Force *(Motor Limited)*	lbf	4399	2578	1237	619	7150	4189	2011	1005	5598	2687	1344
	N	19568	11466	5503	2752	31802	18634	8944	4472	24901	11953	5976
Max Velocity	in/sec	4.0	8.0	20.0	40.0	4.0	8.0	20.0	40.0	8.0	20.0	40.0
	mm/sec	101.6	203.0	508.0	1016.0	101.6	203.0	508.0	1016.0	203.0	508.0	1016.0
Friction Torque *(standard screw)*	in-lbf	4.1				4.6				5.3		
	N-m	0.46				0.53				0.60		
Friction Torque *(preloaded screw)*	in-lbf	10.1				10.6				11.3		
	N-m	1.14				1.21				1.36		
Back Drive Force[1]	lbf	790	260	100	60	790	260	100	60	260	100	60
	N	3500	1160	450	270	3500	1160	450	270	1160	450	270
Min Stroke	in	6				6				10		
	mm	152				152				254		
Max Stroke	in	10	14		10	10	14		10	14		10
	mm	350				350				350		254
C_a (Dynamic Load Rating)	lbf	15693	13197	11656	6363	15693	13197	11656	6363	13197	11656	6363
	N	69806	58703	51848	28304	69806	58703	51848	28304	58703	51848	28304
Inertia *(zero stroke)*	lb-in-s^2	0.02084				0.02300				0.02517		
	Kg-m^2	0.00002356				0.00002599				0.00002844		
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.001208										
	Kg-m^2/mm	0.000001365										
Weight *(zero stroke)*	lb	46.0				53.0				60.0		
	Kg	20.87				24.04				27.2		
Weight Adder *(per unit of stroke)*	lb	3.0										
	Kg	1.36										

[1] Back drive force is nominal value only. Operating conditions can cause wide variations in back drive force. Exlar cannot assure that an actuator will or will not back drive.

*See definitions on page 11

GSX60

Model No. (Motor Stacks)		1 Stack			2 Stack			3 Stack		
Screw Lead Designator		**03**	**05**	**10**	**03**	**05**	**10**	**03**	**05**	**10**
Screw Lead	in	0.25	0.5	1.0	0.25	0.5	1	0.25	0.5	1
	mm	6.35	12.7	25.4	6.35	12.7	25.4	6.35	12.7	25.4
Continuous Force *(Motor Limited)*	lbf	4937	2797	1481	8058	4566	2417	11528	6533	3459
	N	21958	12443	6588	35843	20311	10753	51278	29058	15383
Max Velocity	in/sec	10.0	20.0	40.0	10.0	20.0	40.0	10.0	20.0	40.0
	mm/sec	254.0	508.0	1016.0	254.0	508.0	1016.0	254.0	508.0	1016.0
Friction Torque *(standard screw)*	in-lbf	8.1			10.8			14.5		
	N-m	0.91			1.22			1.64		
Friction Torque *(preloaded screw)*	in-lbf	14.1			16.8			20.5		
	N-m	1.59			1.90			2.32		
Back Drive Force[1]	lbf	470	200	110	470	200	110	470	200	110
	N	2100	890	490	2100	890	490	2100	890	490
Min Stroke	in	6			10			10		
	mm	150			250			250		
Max Stroke	in	10			10			10		
	mm	250			250			250		
C_a (Dynamic Load Rating)	lbf	25300	22800	21200	25300	22800	21200	25300	22800	21200
	N	112540	101420	94302	112540	101420	94302	112540	101420	94302
Inertia *(zero stroke)*	lb-in-s^2	0.0804			0.1114			0.1424		
	Kg-m^2	0.00009087			0.00001259			0.0001609		
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.005190								
	Kg-m^2/mm	0.000005864								
Weight *(zero stroke)*	lb	48			62			76		
	Kg	21.77			28.12			34.47		
Weight Adder *(per unit of stroke)*	lb	8.0								
	Kg	3.63								

[1] Back drive force is nominal value only. Operating conditions can cause wide variations in back drive force. Exlar cannot assure that an actuator will or will not back drive.

DEFINITIONS:

Continuous Force: The linear force produced by the actuator at continuous motor torque.

Max Velocity: The linear velocity that the actuator will achieve at rated motor rpm.

Friction Torque (standard screw): Amount of torque required to move the actuator when not coupled to a load.

Friction Torque (preloaded screw): Amount of torque required to move the actuator when not coupled to a load.

Back Drive Force: Amount of axial force applied to the rod end of the actuator that will produce motion with no power applied to the actuator.

Min Stroke: Shortest available stroke length.

Max Stroke: Longest available stroke length.

C_a (Dynamic Load Rating): A design constant used when calculating the estimated travel life of the roller screw.

Inertia (zero stroke): Base inertia of an actuator with zero available stroke length.

Inertia Adder (per unit of stroke): Inertia per unit of stroke that must be added to the base (zero stroke) inertia to determine the total actuator inertia.

Weight (zero stroke): Base weight of an actuator with zero available stroke length.

Weight Adder (per unit of stroke): Weight adder per unit of stroke that must be added to the base (zero stroke) weight to determine the total actuator weight.

Electrical Specifications

GSX20

Motor Stator		118	138	158	168	218	238	258	268	318*	338*	358*	368*
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.0	11.3	15.0	15.3	14.6	14.9
	Nm	0.86	0.83	0.79	0.79	1.34	1.30	1.25	1.28	1.70	1.73	1.65	1.69
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	2.5	5.2	7.5	9.5	2.5	5.2	8.6	10.1	2.5	5.3	8.8	10.1
	Nm/A	0.28	0.59	0.85	1.07	0.28	0.59	0.97	1.15	0.29	0.59	0.99	1.15
Continuous Current Rating	(Greased) A	3.4	1.6	1.0	0.8	5.4	2.5	1.4	1.2	6.6	3.2	1.9	1.6
	(Oil Cooled) A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
Peak Current Rating	A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5	13.2	6.5	3.7	3.3
O-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.0	11.3	15.0	15.3	14.6	14.9
	Nm	0.86	0.83	0.79	0.79	1.34	1.30	1.25	1.28	1.70	1.73	1.65	1.69
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	1.7	3.7	5.3	6.7	1.7	3.7	6.1	7.2	1.8	3.7	6.2	7.2
	Nm/A	0.20	0.42	0.60	0.76	0.20	0.42	0.69	0.81	0.20	0.42	0.70	0.81
Continuous Current Rating	(Greased) A	4.9	2.2	1.5	1.2	7.6	3.5	2.0	1.8	9.4	4.6	2.6	2.3
	(Oil Cooled) A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
Peak Current Rating	A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5	18.7	9.2	5.3	4.7
MOTOR STATOR DATA													
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	16.9	35.5	51.5	64.8	16.9	35.5	58.6	69.3	17.3	36.0	59.9	69.3
	Vpk/Krpm	23.9	50.2	72.8	91.7	23.9	50.2	82.9	98.0	24.5	50.9	84.8	98.0
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.6	12.5	28.8	45.8	1.1	5.3	15.5	20.7	0.76	3.1	9.6	12.2
Inductance (L-L)(+/– 15%)	mH	4.6	21.4	47.9	68.3	2.5	10.2	28.3	39.5	1.7	7.4	18.5	27.4
Brake Inertia	lbf-in-sec^2	0.00012											
	Kg-cm^2	0.135											
Brake Current @ 24 VDC	A	0.33											
Brake Holding Torque	lbf-in	19											
	Nm	2.2											
Brake Engage/Disengage Time	ms	14/28											
Mechanical Time Constant (tm), ms	min	4.7	5.1	5.5	5.6	2.0	2.1	2.3	2.2	1.3	1.2	1.4	1.3
	max	6.6	7.2	7.9	7.9	2.8	3.0	3.3	3.1	1.8	1.8	1.9	1.8
Electrical Time Constant (te)	ms	1.8	1.7	1.7	1.5	2.2	1.9	1.8	1.9	2.3	2.4	1.9	2.2
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000											
Insulation Class		180 (H)											

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by 0.707 and current by 1.414.
*Refer to performance specifications on page 9 for availability of 3 stack stator by stroke/lead combination.
Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" at 25°C ambient.

Specifications subject to change without notice.

GSX30

Motor Stator		118	138	158	168	218	238	258	268	318*	338*	358*	368*
RMS SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in	16.9	16.8	16.3	16.0	26.9	27.1	26.7	27.0	38.7	38.2	36.2	36.3
	Nm	1.91	1.90	1.84	1.81	3.04	3.06	3.01	3.05	4.37	4.32	4.09	4.10
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	4.4	8.7	15.5	17.5	4.4	8.7	15.5	17.5	4.4	8.7	15.6	17.5
	Nm/A	0.49	0.99	1.75	1.97	0.49	0.99	1.75	1.97	0.50	0.98	1.77	1.98
Continuous Current Rating	(Greased) A	4.3	2.2	1.2	1.0	6.9	3.5	1.9	1.7	9.7	4.9	2.6	2.3
	(Oil Cooled) A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4	19.5	9.9	5.2	4.6
Peak Current Rating	A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4	19.5	9.9	5.2	4.6
O-PK SINUSOIDAL COMMUTATION													
Continuous Motor Torque	lbf-in	16.9	16.8	16.3	16.0	26.9	27.1	26.7	27.0	38.7	38.2	36.2	36.3
	Nm	1.91	1.90	1.84	1.81	3.04	3.06	3.01	3.05	4.37	4.32	4.09	4.10
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	3.1	6.2	11.0	12.4	3.1	6.2	11.0	12.4	3.1	6.1	11.1	12.4
	Nm/A	0.35	0.70	1.24	1.40	0.35	0.70	1.24	1.40	0.35	0.69	1.25	1.40
Continuous Current Rating:	(Greased) A	6.1	3.0	1.7	1.4	9.7	4.9	2.7	2.4	13.8	7.0	3.7	3.3
	(Oil Cooled) A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9	27.6	13.9	7.3	6.5
Peak Current Rating	A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9	27.6	13.9	7.3	6.5
MOTOR STATOR DATA													
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	29.8	59.7	105.8	119.3	29.8	59.7	105.8	119.3	30.3	59.2	106.8	119.8
	Vpk/Krpm	42.2	84.4	149.7	168.7	42.2	84.4	149.7	168.7	42.9	83.7	151.0	169.4
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.7	10.8	36.3	47.9	1.1	4.4	14.1	17.6	0.65	2.6	9.3	11.6
Inductance (L-L)(+/– 15%)	mH	7.7	30.7	96.8	123.0	3.7	14.7	46.2	58.7	2.5	9.5	30.9	38.8
Brake Inertia	lbf-in-sec^2	0.00033											
	Kg-cm^2	0.38											
Brake Current @ 24 VDC	A	0.5											
Brake Holding Torque	lbf-in	70											
	Nm	8											
Brake Engage/Disengage Time	ms	19/29											
Mechanical Time Constant (tm), ms	min	4.9	4.9	5.2	5.4	2.0	2.0	2.0	2.0	1.1	1.2	1.3	1.3
	max	9.4	9.5	10.1	10.5	3.9	3.8	3.9	3.8	2.2	2.3	2.5	2.5
Electrical Time Constant (te)	ms	2.9	2.8	2.7	2.6	3.3	3.4	3.3	3.3	3.8	3.7	3.3	3.3
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000											
Insulation Class		180 (H)											

For amplifiers using peak sinusoidal ratings, multiply RMS sinusoidal Kt by 0.707 and current by 1.414.
*Refer to performance specifications on page 9 for availability of 3 stack stator by stroke/lead combination.
Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 3/8" at 25°C ambient.

Specifications subject to change without notice.

GSX40

Motor Stator		118	138	158	168	218	238	258	268	338*	358*	368*
RMS SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in	47.5	47.5	45.9	45.4	75.1	78.6	78.7	79.5	106.9	105.3	106.9
	Nm	5.37	5.36	5.19	5.13	8.49	8.89	8.89	8.99	12.08	11.90	12.08
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	4.1	8.2	14.5	16.8	4.1	8.2	14.5	16.8	8.4	14.5	16.8
	Nm/A	0.46	0.93	1.64	1.90	0.46	0.93	1.64	1.90	0.95	1.64	1.90
Continuous Current Rating	(Greased) A	12.9	6.5	3.5	3.0	20.5	10.7	6.0	5.3	14.2	8.1	7.1
	(Oil Cooled) A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6	28.5	16.2	14.2
Peak Current Rating	A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6	28.5	16.2	14.2
O-PK SINUSOIDAL COMMUTATION												
Continuous Motor Torque	lbf-in	47.5	47.5	45.9	45.4	75.1	78.6	78.7	79.5	106.9	105.3	106.9
	Nm	5.37	5.36	5.19	5.13	8.49	8.89	8.89	8.99	12.08	11.90	12.08
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	2.9	5.8	10.3	11.9	2.9	5.8	10.3	11.9	5.9	10.3	11.9
	Nm/A	0.33	0.66	1.16	1.34	0.33	0.66	1.16	1.34	0.67	1.16	1.34
Continuous Current Rating	(Greased) A	18.3	9.1	5.0	4.3	28.9	15.1	8.5	7.5	20.1	11.4	10.1
	(Oil Cooled) A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0	40.3	22.9	20.1
Peak Current Rating	A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0	40.3	22.9	20.1
MOTOR STATOR DATA												
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	28.0	56.0	99.3	114.6	28.0	56.0	99.3	114.6	57.3	99.3	114.6
	Vpk/Krpm	39.6	79.2	140.5	162.1	39.6	79.2	140.5	162.1	81.0	140.5	162.1
Pole Configuration		8	8	8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	0.42	1.7	5.7	7.8	0.2	0.72	2.26	3.0	0.5	1.52	2.0
Inductance (L-L)(+/– 15%)	mH	3.0	11.9	37.5	49.9	1.2	5.4	18.2	23.1	4.0	12.0	16.0
Brake Inertia	lbf-in-sec^2	0.00096										
	Kg-cm^2	1.08										
Brake Current @ 24 VDC	A	0.67										
Brake Holding Torque	lbf-in	97										
	Nm	11										
Brake Engage/Disengage Time	ms	20/29										
Mechanical Time Constant (tm), ms	min	4.5	4.5	4.8	4.9	2.1	1.9	1.9	1.9	1.2	1.3	1.2
	max	6.0	6.0	6.4	6.6	2.8	2.6	2.6	2.5	1.7	1.7	1.7
Electrical Time Constant (te)	ms	7.0	7.0	6.6	6.4	5.9	7.5	8.0	7.8	8.2	7.9	8.2
Bus Voltage	Vrms	115	230	400	460	115	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	3000										
Insulation Class		180 (H)										

*Refer to performance specifications on page 10 for availability of 3 stack stator by stroke/lead combination.
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" at 25°C ambient.

Specifications subject to change without notice.

GSX50

Motor Stator		138	158	168	238	258	268	338	358	368
RMS SINUSOIDAL COMMUTATION										
Continuous Motor Torque	lbf-in	107.2	104.8	109.4	179.9	178.8	177.8	233.3	237.2	238.3
	Nm	12.12	11.84	12.36	20.32	20.20	20.09	26.36	26.80	26.93
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	11.8	20.2	23.6	11.8	20.2	23.6	12.0	20.2	24.0
	Nm/A	1.33	2.28	2.67	1.33	2.28	2.67	1.36	2.28	2.71
Continuous Current Rating	(Greased) A	10.2	5.8	5.2	17.0	9.9	8.4	21.7	13.1	11.1
	(Oil Cooled) A	20.3	11.6	10.4	34.1	19.8	16.8	43.4	26.2	22.2
Peak Current Rating	A	20.3	11.6	10.4	34.1	19.8	16.8	43.4	26.2	22.2
O-PK SINUSOIDAL COMMUTATION										
Continuous Motor Torque	lbf-in	107.2	104.8	109.4	179.9	178.8	177.8	233.3	237.2	238.3
	Nm	12.12	11.84	12.36	20.32	20.20	20.09	26.36	26.80	26.93
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	8.3	14.3	16.7	8.3	14.3	16.7	8.5	14.3	17.0
	Nm/A	0.94	1.62	1.88	0.94	1.62	1.88	0.96	1.62	1.92
Continuous Current Rating	(Greased) A	14.4	8.2	7.3	24.1	14.0	11.9	30.7	18.5	15.7
	(Oil Cooled) A	28.7	216.4	14.7	48.2	27.9	23.8	61.4	37.1	31.4
Peak Current Rating	A	28.7	16.4	14.7	48.2	27.9	23.8	61.4	37.1	31.4
MOTOR STATOR DATA										
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	80.6	138.1	161.1	80.6	138.1	161.1	82.0	138.1	164.0
	Vpk/Krpm	113.9	195.3	227.9	113.9	195.3	227.9	116.0	195.3	232.0
Pole Configuration		8	8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	0.87	2.68	3.34	0.34	1.01	1.39	0.22	0.61	0.86
Inductance (L-L)(+/– 15%)	mH	21.7	63.9	78.3	10.4	27.6	41.5	6.3	17.8	28.2
Brake Inertia	lbf-in-sec^2	0.0084								
	Kg-cm^2	9.5								
Brake Current @ 24 VDC	A	1								
Brake Holding Torque	lbf-in	354								
	Nm	40								
Brake Engage/Disengage Time	ms	25/73								
Mechanical Time Constant (tm), ms	min	2.2	2.3	2.1	0.9	0.9	0.9	0.5	0.5	0.5
	max	2.8	3.0	2.7	1.1	1.1	1.1	0.7	0.7	0.7
Electrical Time Constant (te)	ms	25.0	23.9	23.4	30.6	27.3	29.9	28.0	29.0	32.9
Bus Voltage	Vrms	230	400	460	230	400	460	230	400	460
Speed @ Bus Voltage	rpm	2400								
Insulation Class		180 (H)								

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" at 25°C ambient

Specifications subject to change without notice.

GSX60

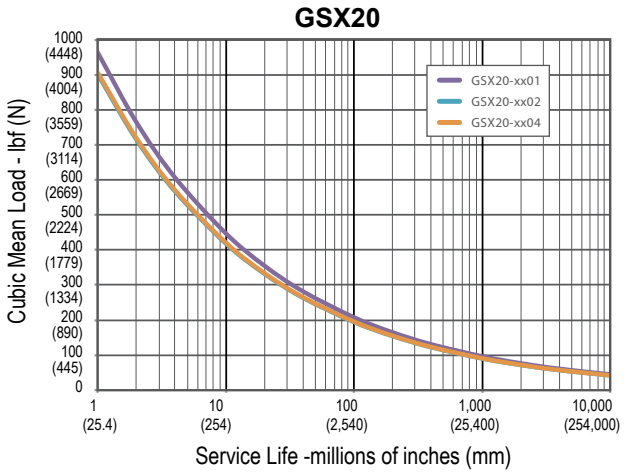
Motor Stator		138	158	168	238	258	268	358	368
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	254.2	249.9	261.9	424.8	423.0	427.5	595.6	615.0
	Nm	28.72	28.23	29.59	47.99	47.79	48.30	67.29	69.49
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	12.6	21.8	25.2	12.6	21.8	25.2	21.4	25.2
	Nm/A	1.42	2.46	2.84	1.42	2.46	2.84	2.42	2.84
Continuous Current Rating	(Greased) A	22.6	12.8	11.6	37.7	21.7	19.0	31.1	27.3
	(Oil Cooled) A	45.2	25.6	23.3	75.5	43.4	38.0	62.2	54.6
Peak Current Rating	A	45.2	25.6	23.3	75.5	43.4	38.0	62.2	54.6
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	254.2	249.9	261.9	424.8	423.0	427.5	595.6	611.6
	(Nm)	28.72	28.23	29.59	47.99	47.79	48.30	67.29	69.10
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	8.9	15.4	17.8	8.9	15.4	17.8	15.1	17.8
	Nm/A	1.01	1.74	2.01	1.01	1.74	2.01	1.71	2.01
Continuous Current Rating	(Greased) A	31.9	18.1	16.4	53.4	30.7	26.8	44.0	38.4
	(Oil Cooled) A	63.9	36.2	32.9	106.7	61.3	53.7	88.0	76.8
Peak Current Rating	A	63.9	36.2	32.9	106.7	61.3	53.7	88.0	76.8
MOTOR STATOR DATA									
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	85.9	148.9	171.8	85.9	148.9	171.8	146.1	171.8
	Vpk/Krpm	121.5	210.6	243.0	121.5	210.6	243.0	206.6	243.0
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	0.3	1.0	1.2	0.13	0.41	0.5	0.23	0.3
Inductance (L-L)(+/– 15%)	mH	8.3	24.8	29.4	3.9	11.8	15.8	7.5	10.3
Brake Inertia	lbf-in-sec^2	0.02815							
	Kg-cm^2	31.8							
Brake Current @ 24 VDC	A	1.45							
Brake Holding Torque	lbf-in	708							
	Nm	80							
Brake Engage/Disengage Time	ms	53/97							
Mechanical Time Constant (tm), ms	min	3.9	4.0	3.6	1.6	1.6	1.6	1.0	0.9
	max	4.3	4.5	4.1	1.8	1.8	1.8	1.1	1.0
Electrical Time Constant (te)	ms	25.4	24.6	24.0	29.4	29.1	29.8	32.1	33.8
Bus Voltage	Vrms	230	400	460	230	400	460	400	460
Speed @ Bus Voltage	rpm	2400							
Insulation Class		180 (H)							

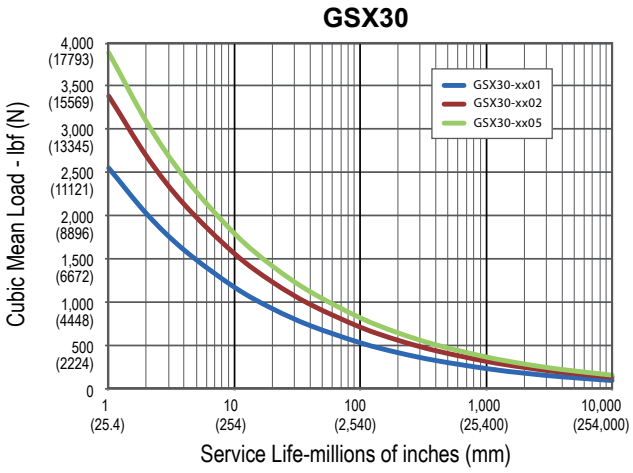
Test data derived using NEMA recommended aluminum heatsink 16" x 16" x 1" at 25°C ambient

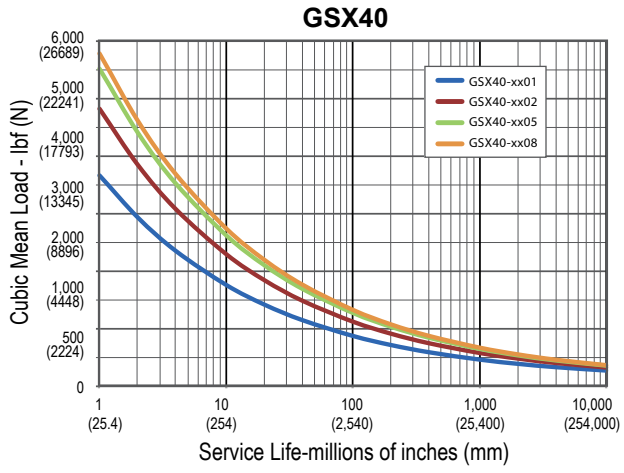
Specifications subject to change without notice.

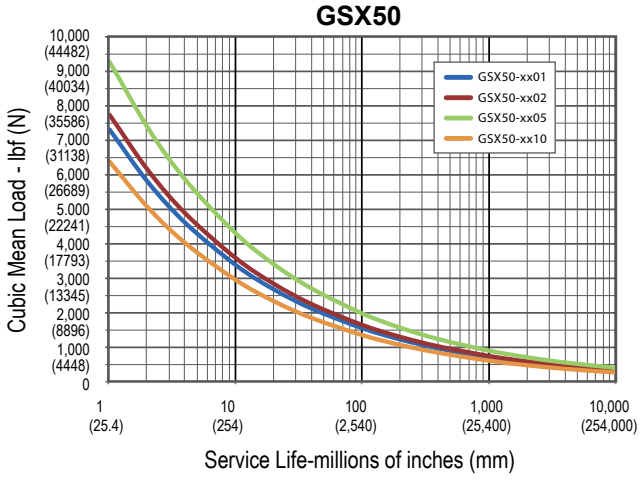
The GSX60-06 can only accommodate a single stack stator.

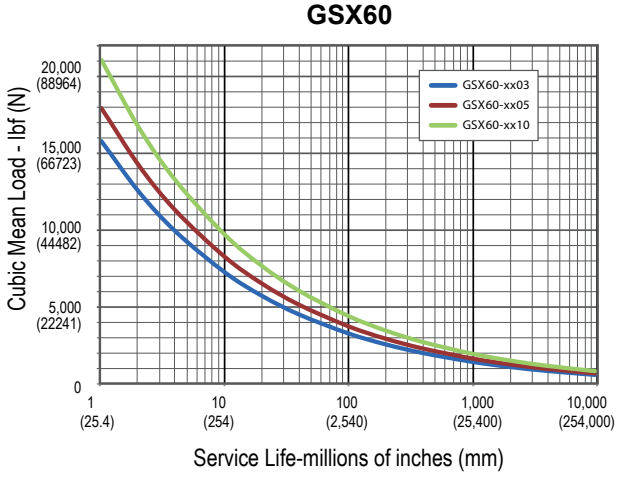
Estimated Service Life











The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:
Travel life in millions of inches, where:

C_a = Dynamic load rating (lbf)
F_{cml} = Cubic mean applied load (lbf)
ℓ = Roller screw lead (inches)

$$L_{10} = \left(\frac{C_a}{F_{cml}}\right)^3 \times \ell$$

For additional details on calculating estimated service life, please refer to the Engineering Reference, page 212.

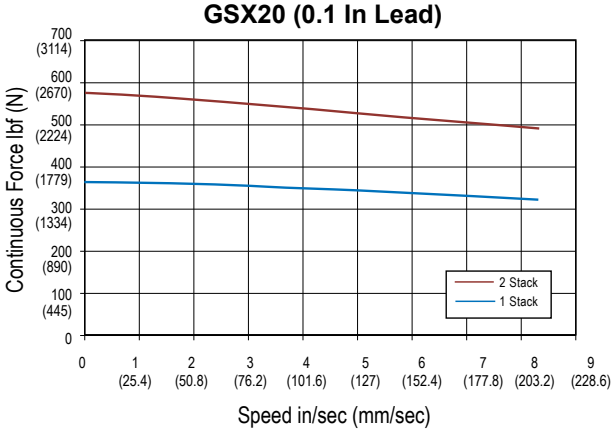
Service Life Estimate Assumptions:

- Sufficient quality and quantity of lubrication is maintained throughout service life (please refer to engineering reference on page 212 for lubrication interval estimates.)
- Bearing and screw temperature between 20° C and 40° C
- No mechanical hard stops (external or internal) or impact loads
- No external side loads
- Does not apply to short stroke, high frequency applications such as fatigue testing or short stroke, high force applications such as pressing. (For information on calculating estimating life for unique applications please refer to the engineering reference on page 212.)

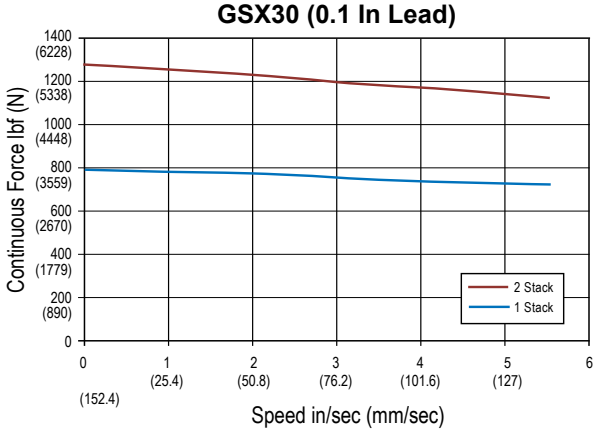
Speed vs. Force Curves

These charts represent typical linear speed versus linear force curves for the GSX actuators using common brushless motor amplifiers. The GSX Series are compatible with many different brushless motor amplifiers; any differences in the performance ratings of these amplifiers can alter the actuator's performance. Thus, the curves below should be used for estimation only. (Further information is available by contacting your local sales representative.)

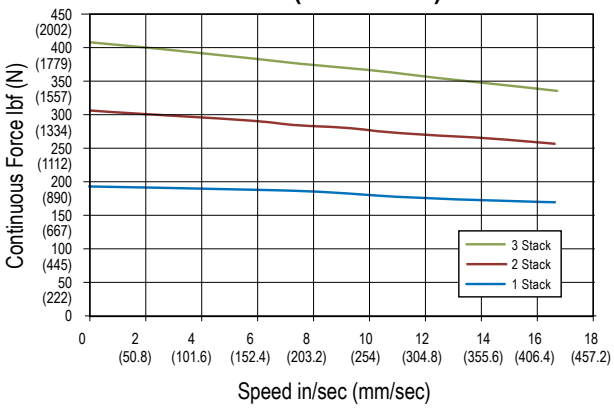
GSX20 (0.1 In Lead)



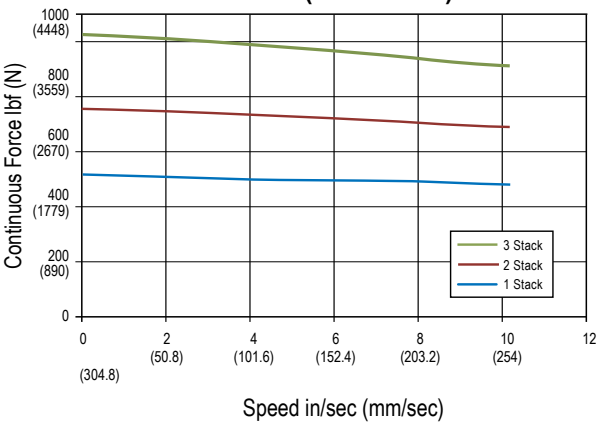
GSX30 (0.1 In Lead)



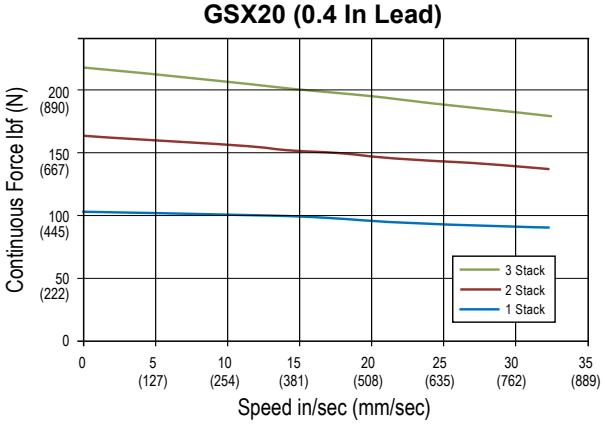
GSX20 (0.2 In Lead)



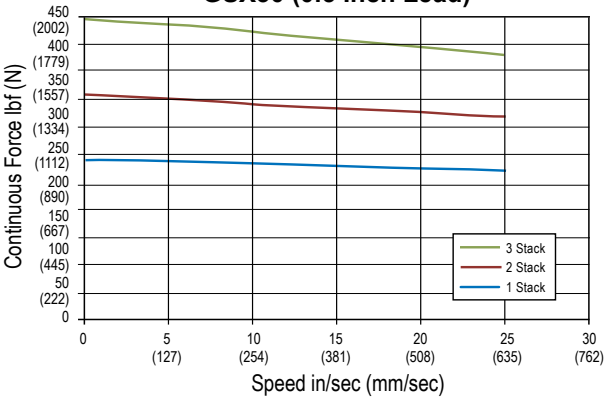
GSX30 (0.2 In Lead)



GSX20 (0.4 In Lead)



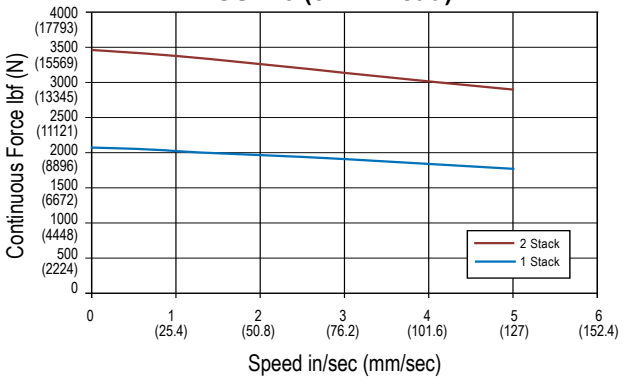
GSX30 (0.5 Inch Lead)



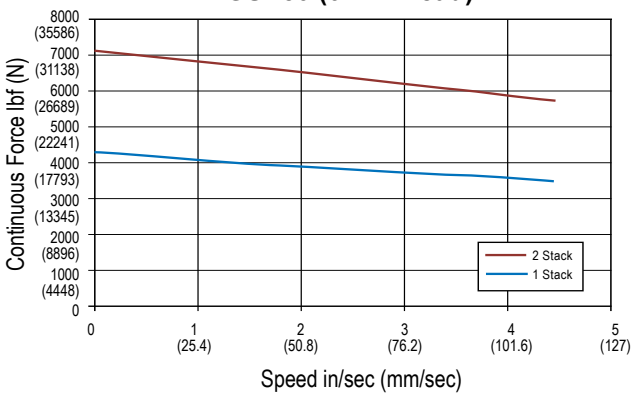
See page 24 for explanation of motor stator options (1x8, 2x8, 3x8)
See page 9 for mechanical specifications

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" for GSX20 and 10" x 10" x 3/8" for GSX30. Testing ambient temperature 25°C.

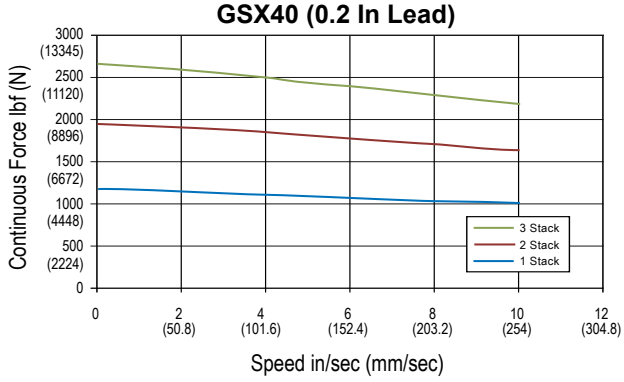
GSX40 (0.1 In Lead)



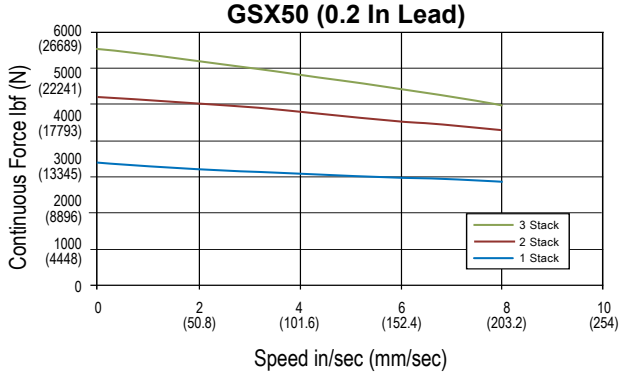
GSX50 (0.1 In Lead)



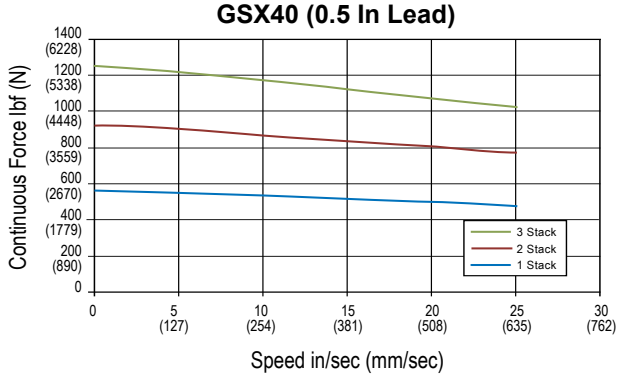
GSX40 (0.2 In Lead)



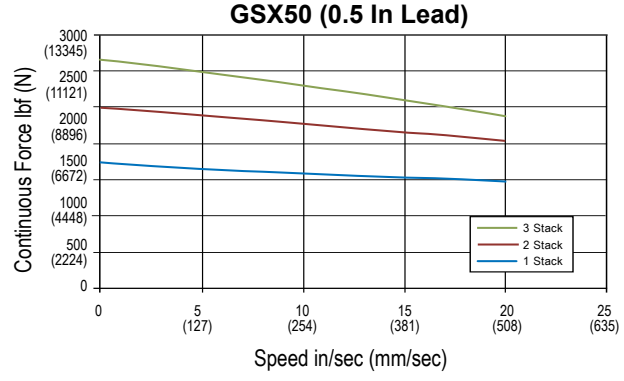
GSX50 (0.2 In Lead)



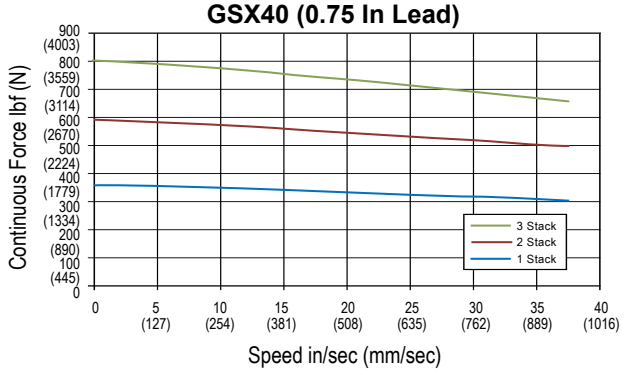
GSX40 (0.5 In Lead)



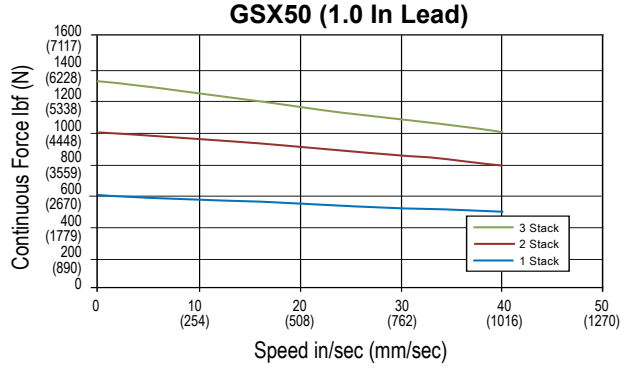
GSX50 (0.5 In Lead)

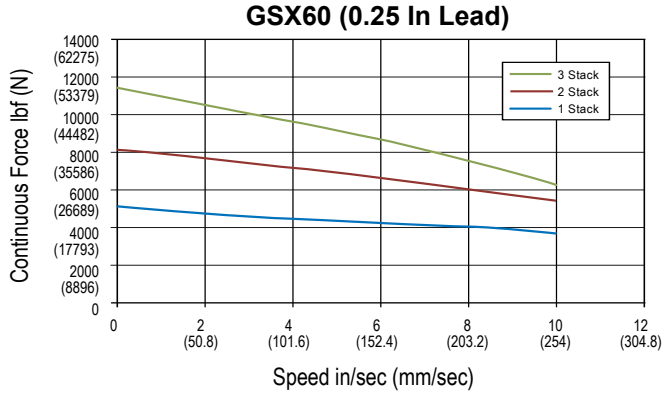


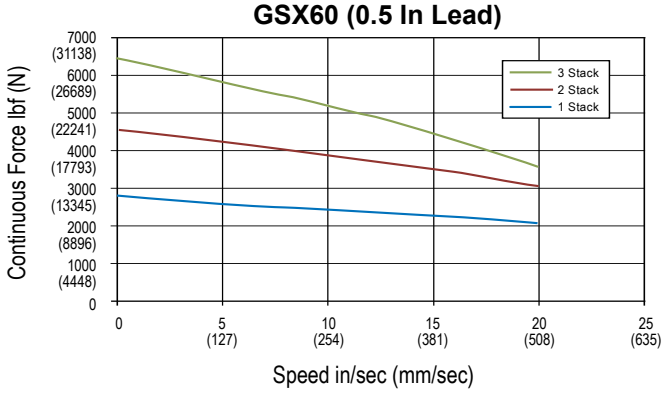
GSX40 (0.75 In Lead)

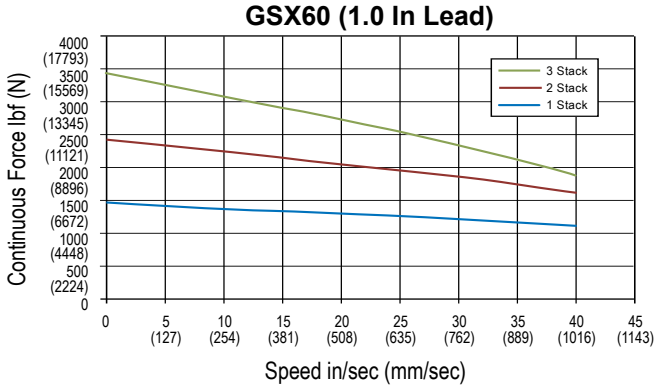


GSX50 (1.0 In Lead)









See page 24 for explanation of motor stator options (1x8, 2x8, 3x8)
See page 9 for mechanical specifications

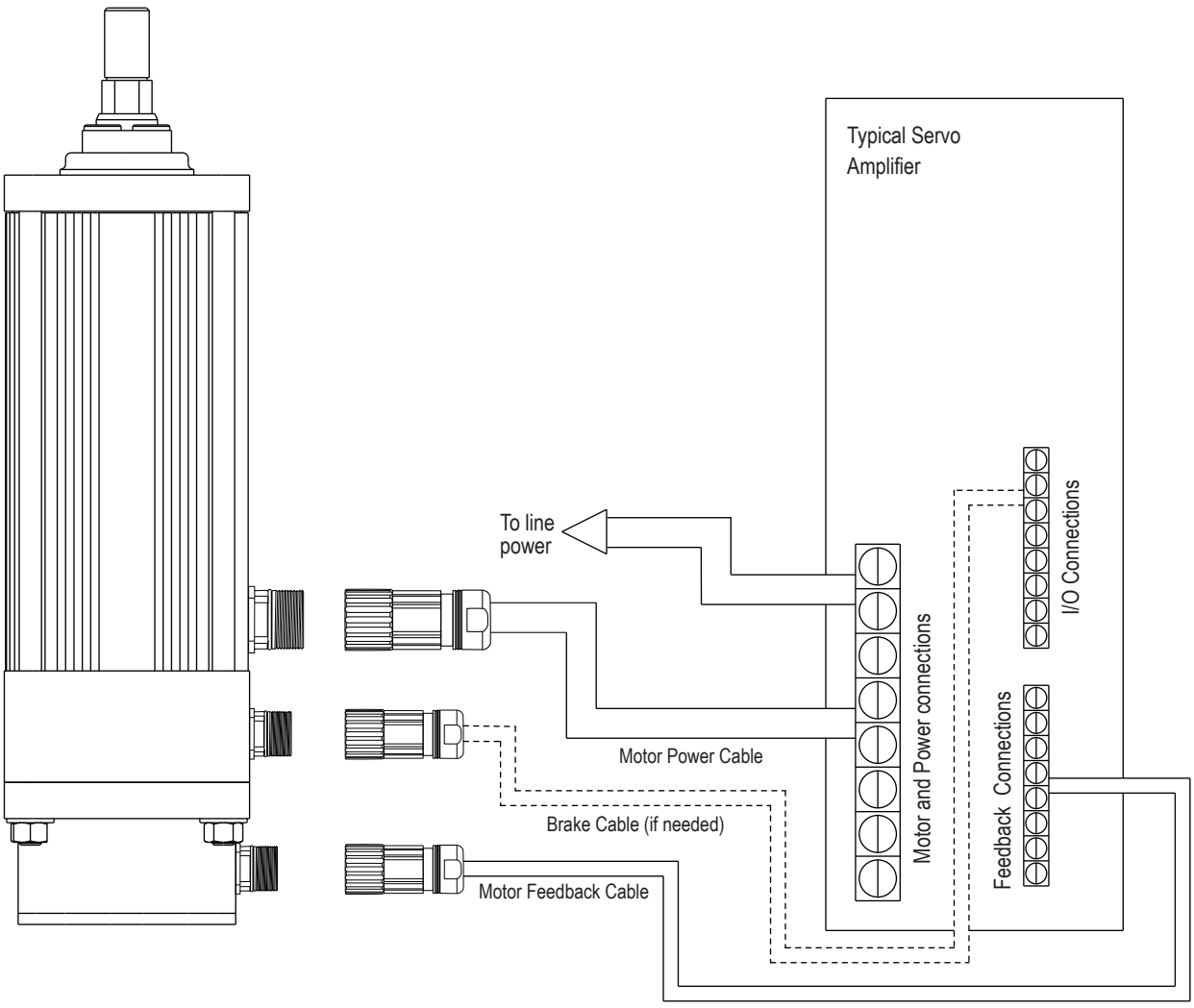
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" for GSX40 and 12" x 12" x 1/2" for GSX50. Testing ambient temperature 25°C.

System Configuration

GSX Series actuators include an integrated brushless servo motor. The unique design gives users a variety of feedback configuration options so GSX units can be powered by almost any brushless motor amplifier on the market.

This flexibility means GSX actuators can be incorporated into today's high performance single and multi-axis motion control systems. For food and beverage packaging, to multi-axis turning centers, to aircraft assembly, the GSX Series units offers incredible performance and durability.

The schematic below shows typical connections for a single axis system with actuator and servo amplifier.



Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

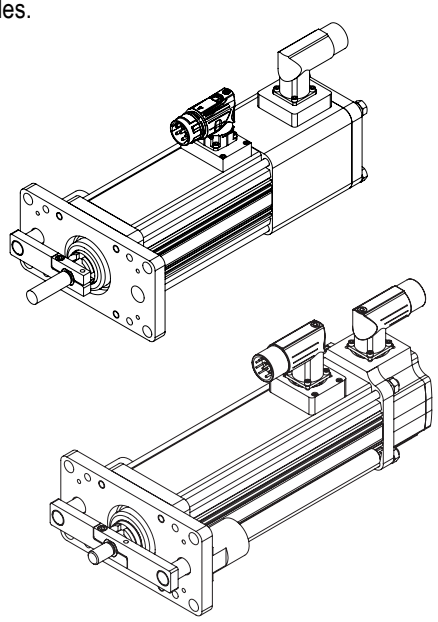
Options

AR =Anti-rotation Option

The unique design of the GSX Series of linear actuators permits the extending rod to rotate. This capability simplifies setup by allowing the user to rotate the rod in and out of the actuator for mechanical attachment or system testing.

However, this feature also requires that once setup and testing are completed, the rod be kept from rotating so proper linear motion will be maintained. In most applications the actuator's load is coupled to linear bearings, or some other support device. In these cases the load cannot rotate, so a separate anti-rotation system is not needed.

For applications in which the load is free to rotate, Exlar offers anti-rotation systems. Shorter GSX units use an anti-rotation arm on one side of the actuator. Longer strokes use arms on both sides.



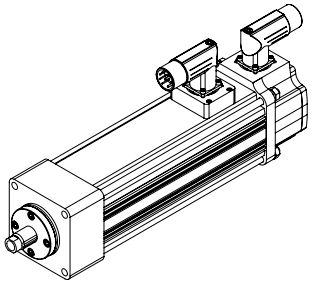
RB = Rear Electric Brake

This option provides an internal holding brake for GSX Series actuators. The brake is spring activated and electrically released.

SR = Splined Main Rod

This option provides a ball spline shafting main rod with a ball spline nut that replaces the standard front seal and bushing assembly. This rod restricts rotation without the need for an external mechanism. The rod diameter will be the closest metric equivalent to our standard rod sizes. Since this option is NOT sealed, it is not suitable for environments in which contaminants may enter the actuator.

Note: This option affects overall length and mounting dimensions for GSX actuators. Consult your local sales representative if using splined main rod. Due to the reduced diameter of the splined main rod on the GSX50, the standard "A", "F", and "B" rod ends are not available and an "X" should be used in the model mask. Please see Actuator Rod Ends with Splined Main Rod Options on page 32 for dimensions.

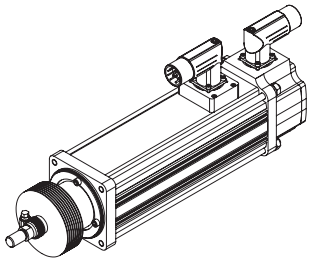


PF = Preloaded Follower

This option offers a true zero backlash follower for the GSX Series actuator. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw for the same application. The preloaded follower is not available with the LT linear feedback option.

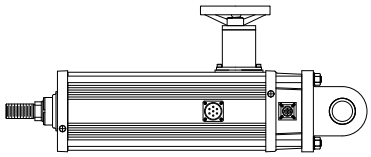
PB = Protective Bellows

This option provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the operating environment. The standard material of this bellows is S2 Neoprene coated nylon with sewn construction. This standard bellows is rated for environmental temperatures of -40 to 250 degrees F. Longer strokes require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative for details.



HW = Manual Drive – Handwheel

A manual drive handwheel installed on the side of the actuator. Includes an engage/disengage lever that controls an interrupt switch. This lever is not tied to the motor and must be engaged/disengaged, before operating the motor. Not available on all products and may not be available with a holding brake.



L1, L2, L3 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included with the GSX Series Actuator. These switches provide travel indication to the controller and are adjustable (must purchase external anti-rotate for this option). See page 31 for details.

Motor Speed

All Exlar T-LAM motors and actuators carry a standard motor speed designator (see chart). This is representative of the standard base speed of the motor for the selected bus voltage.

Designator	Base Speed	Actuator/ Motor Series
-50	5000 rpm	GSX20
-30	3000 rpm	GSX30, GSX40
-24	2400 rpm	GSX50, GSX60
01-99	Special Speed, Consult Exlar	

If the model number is created and the location for the motor speed designator is left blank, this is the base speed to which the motor will be manufactured. The model number can also be created including this standard speed designator.

Exlar also provides the flexibility to manufacture all of its T-LAM products with special base speeds to match your exact application requirements. This may be a higher than standard speed motor, or lower base speed than standard which will allow you to get the required torque at a speed optimized to your application and use the minimum amount of current from your amplifier.

The call-out for a special speed is configured in the model number by using a two digit code from 01-99. This code represents the number, in hundreds, of RPM that is the base speed for the particular motor.

For example, a GSX30-0301-OSM-AD1-118-30 motor that normally has a 3000 RPM standard winding can be changed to a 3300 RPM winding by changing the -30 to a -33. It can be changed to a 5000 RPM winding by changing the -30 to a -50.

Changing this speed designator changes the ratings of the motor; these must be obtained from your local sales representative. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage, so please contact your local sales representative for confirmation of the speed that is desired for the application.

Feedback

Absolute Feedback

Due to the variability in size of some feedback devices, especially absolute feedback devices which are often very large relative to the size of the actuator motor, the actual size of the actuator may differ in length and width from these drawings for feedback types other than standard resolvers and standard encoders. Please consult Exlar for details. In the event that you order an actuator that differs from these standard dimensions, you will be sent a drawing of the final configuration of your actuator for approval.

Motor Stators

GSX motor options are described with a 3 digit code. The first digit calls out the stack length, the second the rated bus voltage, and the third the number of poles of the motor. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

118	1 stack	115 Vrms	8 Pole	Class 180 H
138		230 Vrms		
158		400 Vrms		
168		460 Vrms		
1A8*		24 VDC		
1B8*		48 VDC		
1C8*		120 VDC		
218	2 stack	115 Vrms	8 Pole	Class 180 H
238		230 Vrms		
258		400 Vrms		
268		460 Vrms		
2A8*		24 VDC		
2B8*		48 VDC		
2C8*		120 VDC		
318	3 stack	115 Vrms	8 Pole	Class 180 H
338		230 Vrms		
358		400 Vrms		
368		460 Vrms		
3A8*		24 VDC		
3B8*		48 VDC		
3C8*		120 VDC		

* Low voltage stators may be limited to less than catalog rated torque and/or speed. Please contact your local sales representative when ordering this option.

Rod End Attachments

Rear Clevis Pin
Rod Eye
Spherical Rod Eye
Rod Clevis

See drawings on pages 32-34.
Attachments ordered separate from actuator.

Oil Cooling and Lubrication Option

If you plan to use oil cooling with your GSX actuator, consult your local sales representative to discuss your application.

Exlar GSX actuators are normally delivered with high performance synthetic grease as a lubricant. The application of grease for the roller screw mechanism and bearings has proven adequate in thousands of applications over 25 years. However, in applications where the actuator is operated under high load, high speed and/or high duty cycle for extended periods of time, the grease will degrade prematurely and will eventually fail to provide the lubrication needed to maintain the operating efficiency and integrity of the roller screw and bearings. Continued operation of the actuator after the grease has broken down will cause premature failure of the device.

An ideal way to both lubricate and cool a GS Series actuator in high performance applications is to flow a small amount of oil at low pressure through the actuator while it is in operation. A small amount of oil flow can, in many cases, allow operation of the actuator beyond normal continuous rated power levels. Oil flow lubrication has been used successfully and extensively in the field, allowing Exlar actuators to deliver thousands of hours of service between re-lubrication intervals even in the most arduous of applications.

Oil lubrication also significantly reduces actuator maintenance, saving valuable production time. With a recirculating oil system, lubricating oil is easily changed without having to access or dismount the actuator. The ability to monitor oil condition can extend the usable life of the actuator by keeping the lubrication clean and fresh.

Some special application and actuator configuration considerations must be addressed prior to selecting and ordering a GS actuator with oil lubrication. Please consult with Exlar Application Engineering prior to purchase.

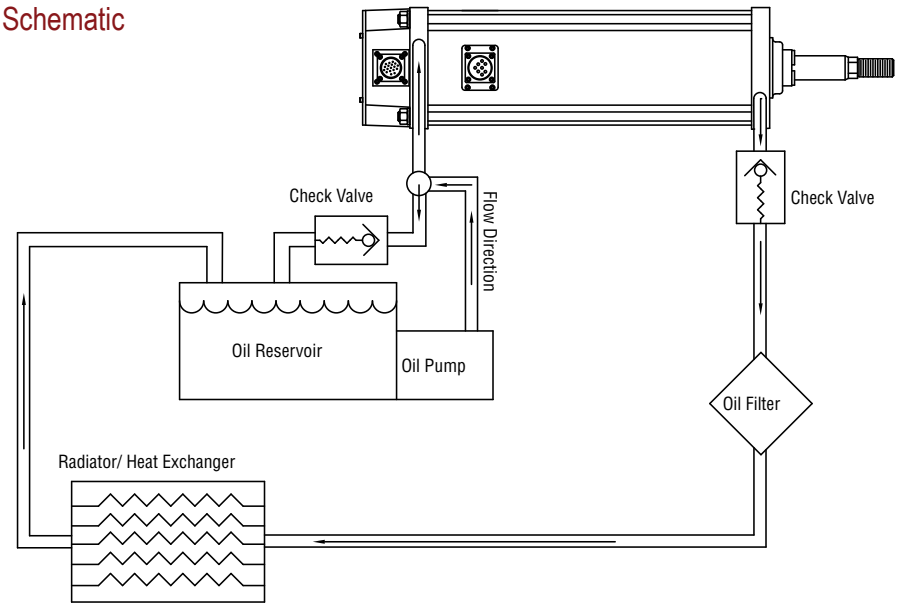
A typical oil flow lubrication system involves use of a commercially available lubrication pump and plumbing to recirculate the oil. A schematic example of a possible oil system is shown below. Exlar Application Engineering can assist you in the development of an appropriate oil system, or recommend a pre-packaged oil circulation system.

If you plan to use oil cooling with your GSX actuator, please consult Exlar to discuss your application.

Oil pressure within the actuator should never exceed 5 psi.

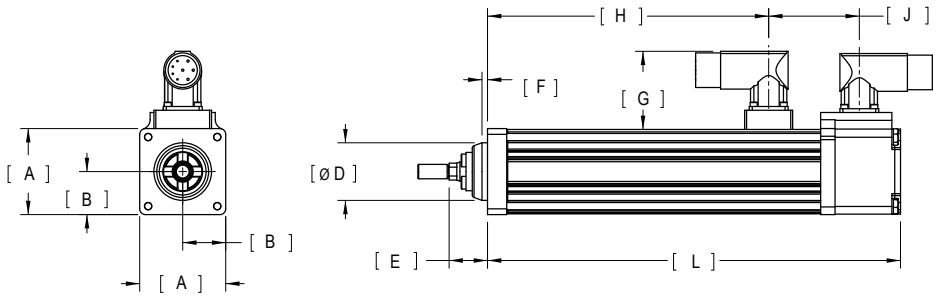
The Oil cooling option will limit maximum actuator acceleration.

Example Oil System Schematic
(Customer Supplied)



Dimensions

Base Actuator



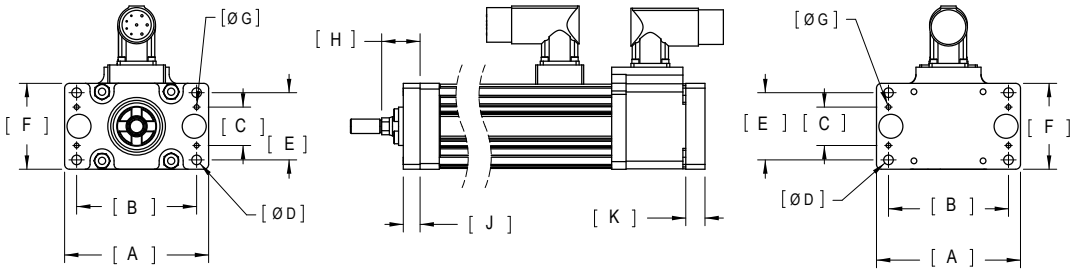
		GSX20	GSX30	GSX40	GSX50	GSX60
A	in	2.24	3.05	3.90	5.50	7.00
	mm	56.9	77.4	99.1	139.7	177.8
B	in	1.12	1.52	1.95	2.75	3.5
	mm	28.4	38.7	49.5	69.9	88.9
Ø D	in	1.500 +0.00/-0.03	2.000 +0.00/-0.03	2.500 +0.00/-0.03	3.000 +0.00/-0.03	3.375 +0.00/-0.03
	mm	38.10 +0.00/-0.08	50.80 +0.00/-0.08	63.50 +0.00/-0.08	76.20 +0.00/-0.08	85.73 +0.00/-0.08
E [5]	in	1.00	1.32	1.65	2.13	1.94
	mm	25.4	33.5	41.9	54.0	49.4
F	in	0.14	0.09	0.10	0.13	0.13
	mm	3.7	2.3	2.5	3.2	3.2
G	in	2.04	2.04	2.04	2.04	2.04
	mm	51.7	51.7	51.7	51.7	51.7
H ***(zero stroke)***	in	1.3	1.5	2.9	4.0	3.6
	mm	34	38	73	102	93
J [4]	in	2.36	2.63	2.63	3.09	4.18
	mm	60.0	66.7	66.7	78.6	106.2
L [4] ***(zero stroke)***	in	4.8	5.2	6.6	8.3	9.2
	mm	122	133	167	212	235

1. Dimensions shown are for referencing only and are subject to change
2. Dimensions reflect Exlar standard M23 style connectors (option I)
3. Dimensions may vary based on options selected. Consult Exlar for details or refer to drawings provided after receipt of order
4. If ordering a brake, add the following to dimensions J and L:
   GSX20 add 1.78 in (45.2 mm)
   GSX30 add 1.60 in (40.6 mm)
   GSX40 add 2.33 in (59.2 mm)
   GSX50 add 2.50 in (63.5 mm)
   GSX60 add 3.58 in (90.9 mm)
5. If ordering bellows add 2 in (50.8 mm) to dimension E.

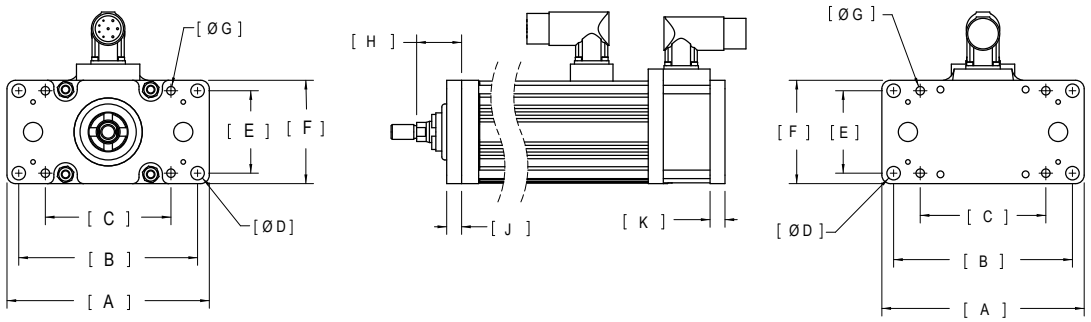
Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Front or Rear Flange Mount

GSX20, GSX50



GSX30, GSX40, GSX60



		GSX20	GSX30	GSX40	GSX50	GSX60
A	in	3.75	5.94	7.68	9.50	12.50
	mm	95.3	150.9	195.1	241.3	317.5
B	in	3.13	5.25	6.80	7.63	10.17
	mm	79.4	133.4	172.7	193.7	258.4
C	in	1.00	3.69	5.25	3.25	8.13
	mm	25.4	93.7	133.4	82.6	206.4
Ø D	in	0.250	0.397	0.516	0.563	0.781
	mm	6.35	10.08	13.10	14.29	19.84
E	in	1.75	2.43	2.92	4.88	5.38
	mm	44.5	61.7	74.2	123.8	136.5
F	in	2.24	3.05	3.80	6.50	6.80
	mm	56.8	77.4	96.5	165.1	172.7
Ø G	in	0.125 +0.001/-0.000	0.250 ±0.0005	0.250 ±0.001	0.250 +0.001/-0.000	0.250 +0.0005/-0.0000
	mm	3.18 +0.03/-0.00	6.35 ±0.013	6.35 ±0.025	6.35 +0.03/0.00	6.35 +0.013/0.000
H [1]	in	1.00	1.32	1.65	2.13	1.94
	mm	25.4	33.5	41.9	54.0	49.4
J [1]	in	0.44	0.44	0.63	0.75	0.75
	mm	11.1	11.1	15.9	19.1	19.1
K	in	0.50	0.44	0.63	0.75	1.31
	mm	12.7	11.1	15.9	19.1	33.3

1. If ordering a splined main rod, add the following to dimensions H and J:
   GSX20 add .50 in (12.7 mm), GSX30 add 1.20 in (30.5 mm), GSX40 add 1.77 in (45.0 mm)
   GSX50 add 2.06 in (52.3 mm), GSX60 add 2.73 in (69.3 mm)

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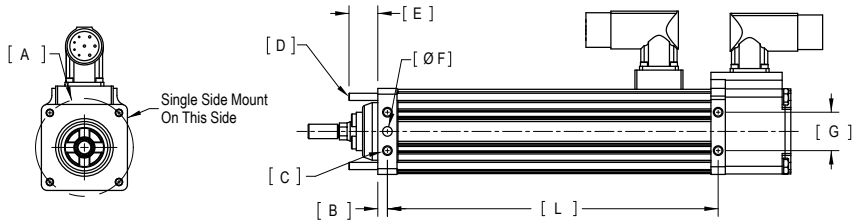
Side Mount or Extended Tie Rod Mount



		GSX20	GSX30	GSX40	GSX50	GSX60
Ø A	in	2.546	3.536	4.243	6.125	7.778
	mm	64.66	89.80	107.76	155.58	197.57
B [2]	in	0.25	0.25	0.31	0.41	0.44
	mm	6.4	6.4	7.9	10.3	11.1
C [1]	in	1/4-20 UNC	1/4-20 UNC	3/8-16 UNC	1/2-13 UNC	5/8-11 UNC
	mm	M6 x 1.0	M6 x 1.0	M10 x 1.5	M12 x 1.75	M16 x 2
D	in	10-24 UNC	1/4-20 UNC	3/8-16 UNC	1/2-13 UNC	9/16-12 UNC
	mm	M5 x 0.8	M6 x 1.0	M8 x 1.25	M12 x 1.75	M14 x 2
E	in	0.75	0.96	1.38	1.50	1.65
	mm	19.1	24.4	35.1	38.1	41.9
Ø F	in	0.2500 +0/-0.0005↧0.25	0.2500 +0/-0.0005↧0.25	0.3750 +0/-0.0005↧0.44	0.5000 +0/-0.0005↧0.50	0.5000 +0/-0.0005↧0.62
	mm	6 mm M7↧9.0	6 mm M7↧9.5	8 mm M7↧12.0	12 mm M7↧12.0	12 mm M7↧12.0"
G	in	1.00	1.75	1.75	3.00	3.00
	mm	25.4	44.5	44.5	76.2	76.2
L *(zero stroke)*	in	2.6	3.1	4.3	5.1	5.9
	mm	67	80	109	130	150

1. Side mount options S and J = 4X, D and K = 8X for dimension C
2. If ordering a splined main rod, add the following to dimension B:
   GSX20 add .50 in (12.7 mm)
   GSX30 add 1.20 in (30.5 mm)
   GSX40 add 1.77 in (45.0 mm)
   GSX50 add 2.06 in (52.3 mm)
   GSX60 add 2.73 in (69.3 mm)

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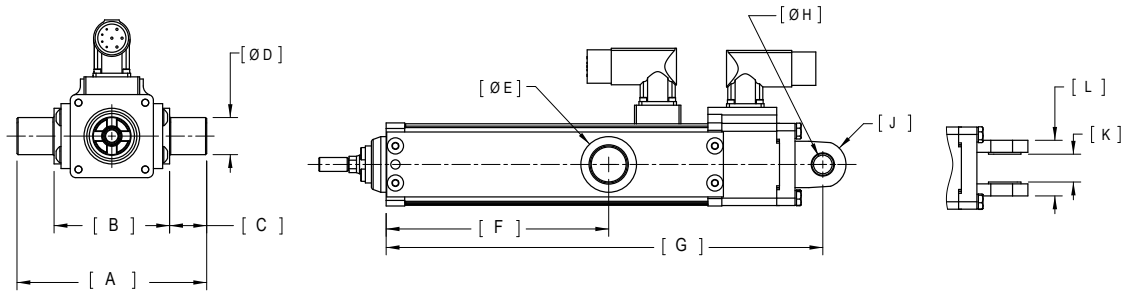
Side Trunnion Mount of Rear Clevis Mount



		GSX20	GSX30	GSX40	GSX50	GSX60
A	in	5.12	5.92	6.90	10.00	12.55
	mm	129.9	150.4	175.2	254.0	318.8
B	in	3.12	3.92	4.90	7.00	8.55
	mm	79.1	99.6	124.4	177.8	217.2
C	in	1.00	1.00	1.00	1.50	2.00
	mm	25.4	25.4	25.4	38.1	50.8
Ø D	in	1.000 +/-0.001	1.000 +/-0.001	1.500 +/-0.001	2.000 +/-0.001	2.500 +/-0.001
	mm	25 h7	25 h7	35 h7	50 h7	60 h9
Ø E	in	1.50	1.50	2.00	2.50	3.50
	mm	38.1	38.1	50.8	63.5	88.9
F *(3" stroke)*	in	3.0	5.4	NA	NA	NA
	mm	76	137	NA	NA	NA
F *(4" stroke)*	in	NA	NA	4.0	NA	NA
	mm	NA	NA	102	NA	NA
F *(6" stroke)*	in	6.0	6.0	6.0	6.0	6.0
	mm	152	152	152	152	152
F *(8" stroke)*	in	NA	NA	8.0	NA	NA
	mm	NA	NA	203	NA	NA
F *(10" stroke)*	in	10.0	10.0	10.0	10.0	10.0
	mm	254	254	254	254	254
F *(12" stroke)*	in	12.0	12.0	12.0	NA	NA
	mm	305	305	305	NA	NA
F *(14" stroke)*	in	NA	14.0	NA	14.0	NA
	mm	NA	356	NA	356	NA
F *(18" stroke)*	in	NA	18.0	18.0	NA	NA
	mm	NA	457	457	NA	NA
G [1] *(zero stroke)*	in	5.8	6.5	8.3	NA	NA
	mm	147	165	210	NA	NA
Ø H	in	0.500 +0.002/-0.001	0.750 +0.002/-0.001	0.750 +0.002/-0.001	1.000 +0.002/-0.001	1.750 +0.002/-0.001
	mm	12 +0.01/-0.06	20 +0/-0.07	20 +0/-0.07	25 +0/-0.07	45 +0/-0.07
J	in	0.63	0.75	0.75	1.00	2.13
	mm	15.9	19.1	19.1	25.4	54.0
K	in	1.50	2.50	2.50	3.00	5.00
	mm	38.1	63.5	63.5	76.2	127.0
L	in	0.75	1.25	1.25	1.50	2.50
	mm	19.1	31.8	31.8	38.1	63.5

1. If ordering a brake, add the following to dimension G:
GSX20 add 1.78 in (45.2 mm), GSX30 add 1.60 in (40.6 mm), GSX40 add 2.33 in (59.2 mm), GSX50 add 2.5 in (63.5 mm), GSX60 add 3.58 in (90.9 mm)

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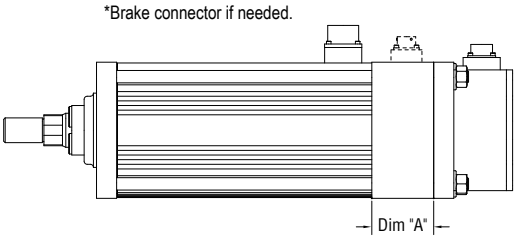
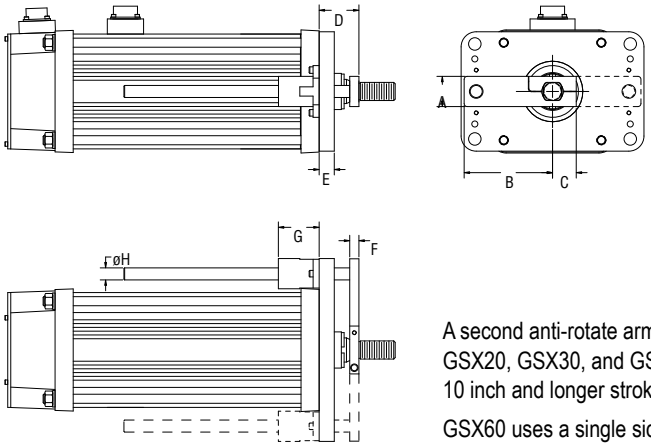
Rear Brake Extension Option



	GSX20	GSX30	GSX40	GSX50	GSX60
A in (mm)	1.78 (45.2)	1.60 (40.6)	2.33 (59.2)	2.50 (63.5)	3.58 (90.9)

*Consult Exlar for connector and wiring information if ordering brake option.

Anti-rotation Option GSX/M20, GSX/M30, GSX/M40 and GSX60

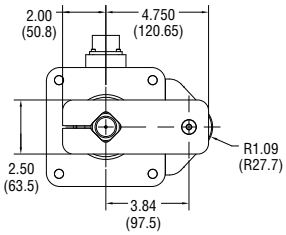


Dims in (mm)	GSX/M20	GSX/M30	GSX/M40	GSX60
A	0.60 (15.2)	0.79 (20.1)	1.25 (31.8)	1.75 (44.5)
B	1.81 (46.0)	2.54 (64.5)	3.78 (96.0)	5.79 (147)
C	0.54 (13.7)	0.71 (18.0)	0.98 (24.9)	1.55 (39.4)
D	1.00 (25.4)	1.30 (33.0)	1.64 (41.7)	1.94 (49.3)
E	0.44 (11.2)	0.44 (11.2)	0.63 (16.0)	0.75 (19.1)
F	0.28 (7.11)	0.32 (8.13)	0.38 (9.65)	0.50 (12.7)
G	0.31 (7.87)	1.69 (42.9)	1.69 (42.9)	2.81 (71.4)
øH	0.37 (9.40)	0.50 (12.7)	0.50 (12.7)	1.00 (25.4)

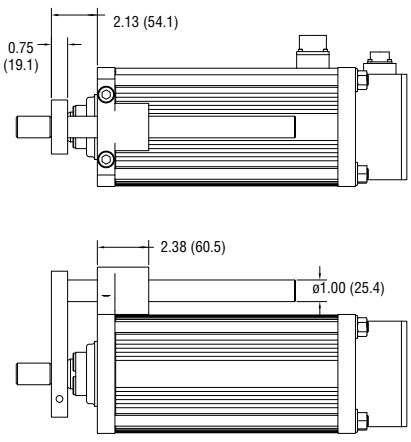
A second anti-rotate arm is used on GSX20, GSX30, and GSX40 models with 10 inch and longer stroke lengths.

GSX60 uses a single sided anti-rotate for all stroke lengths.

Anti-rotation Option GSX50



NOTE: GSX50 actuators use one arm for all stroke lengths.



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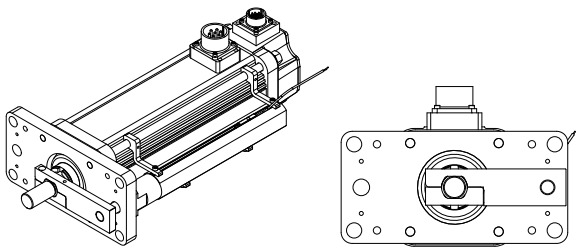
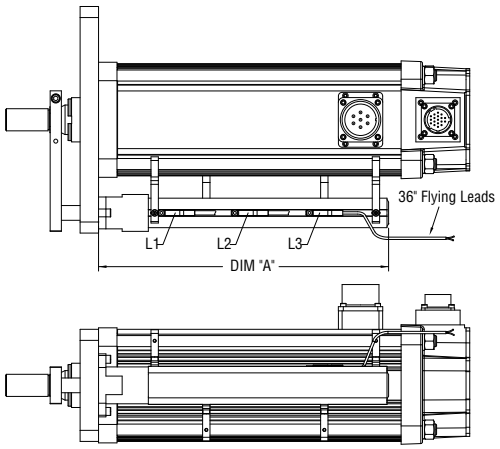
External Limit Switch Option

The external limit switch option (requires anti-rotate option) for the GSX Series of linear actuators provides the user with 1, 2, or 3 externally mounted adjustable switches for use as the end of travel limit switches or home position sensors.

The number of switches desired is selected by ordering the L1, L2, or L3 option, in which 1, 2 or 3 switches will be provided, respectively.

The switches are 9-30 VDC powered, PNP output, with either normally open or normally closed logic operation depending on the switch configuration ordered. Switches are supplied with 1 meter of 3-wire embedded cable. Below is a diagram indicating which logic operation will be provided for each switch, based on the option ordered.





Dim A	3 inch (76 mm) stroke in (mm)	6 inch (152 mm) stroke in (mm)	8 inch (203 mm) stroke in (mm)	10 inch (254 mm) stroke in (mm)	12 inch (305 mm) stroke in (mm)	14 inch (355 mm) stroke in (mm)	18 inch (457 mm) stroke in (mm)
GSX20	5.515 (140.1)	8.515 (216.3)	NA	12.500 (317.5)	14.515 (368.7)	NA	NA
GSX30	6.932 (176.1)	9.832 (249.7)	NA	13.832 (351.3)	15.832 (402.1)	17.832 (452.9)	21.832 (554.5)
GSX40	NA	9.832 (249.7)	11.83 (300.5)	13.832 (351.3)	15.832 (402.1)	NA	21.832 (554.5)
GSX50	NA	11.667 (296.3)	NA	15.667 (397.9)	NA	19.667 (499.5)	NA
GSX60	NA	10.461 (265.7)	NA	14.461 (367.3)	NA	NA	NA

Option	SW1	SW2	SW3
L1	Not Supplied	Normally Open	Not Supplied
L2	Normally Closed	Not Supplied	Normally Closed
L3	Normally Closed	Normally Open	Normally Closed

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	43404	BIM-UNT-RP6X
Normally Open Switch	43403	BIM-UNT-AP6X

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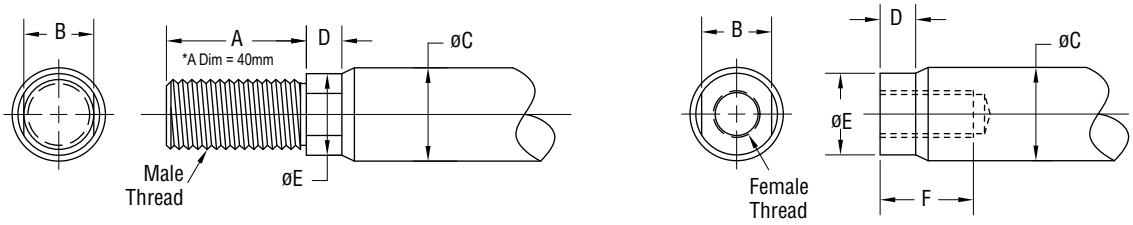
Actuator Rod End Options



Standard Rod End

	A	B	øC	D	øE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSX20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.500 (12.7)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3⁄8 – 24 UNF – 2A	M8 x 1 6g	5/16 – 24 UNF – 2B	M8 x 1 6h
GSX30 in (mm)	0.750* (19.1)	0.500 (12.7)	0.625 (15.9)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF– 2A	M12 x 1.75* 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSX40 in (mm)	1.500 (38.1)	0.750 (19.1)	1.000 (25.4)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3⁄4 – 16 UNF – 2A	M16 x 1.5 6g	5/8 – 18 UNF – 2B	M16 x 1.5 6h
GSX50 in (mm)	1.625 (41.3)	1.125 (28.6)	1.375 (34.9)	0.750 (19.1)	1.250 (31.8)	1.750 (44.5)	1 – 14 UNS – 2A	M27 x 2 6g	1 – 14 UNS – 2B	M24 x 2 6h
GSX60 in (mm)	2.500 (63.5)	1.250 (31.8)	1.750 (44.5)	0.550 (14.0)	1.625 (41.3)	1.750 (44.5)	1 1/4 – 12 UNF – 2A	M30 x 2 6g	7/8 – 14 UNF – 2B	M25 x 1.5 6h

Rod End with Splined Main Rod

	A	B	C	D	E	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSX20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.512 (13.0)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3⁄8 – 24 UNF – 2A	M8 x 1 6g	5/16 – 24 UNF – 2B	M8 x 1 6h
GSX30 in (mm)	0.750* (19.1)	0.500 (12.7)	0.630 (16.0)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF– 2A	M12 x 1.75* 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSX40 in (mm)	1.500 (38.1)	0.750 (19.1)	0.906 (23.0)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3⁄4 – 16 UNF – 2A	M16 x 1.5 6g	5/8 – 18 UNF – 2B	M16 x 1.5 6h
GSX50 in (mm)	1.625 (41.3)	1.000** (25.4)	1.102 (28.0)	0.750*** (19.1)	1.102 (28.0)	1.500 (38.1)	1 – 14 UNS – 2A	M24 x 2 6g	3/4 – 16 UNF – 2B	M20 x 1.5 6h
GSX60 in (mm)	2.500 (63.5)	1.250 (31.8)	1.850 (47.0)	0.550 (14.0)	1.625 (41.3)	1.750 (44.5)	1 1/4 – 12 UNF – 2A	M30 x 2 6g	7/8 – 14 UNF – 2B	M25 x 1.5 6h

* When Male, Metric (A), Dimension A = 1.575 (40 mm)
** When Male, Metric (A), Dimension B = 0.945 (24 mm)
***When Male (M or A) = 0.500 in (12.7 mm)

Part numbers for rod attachment options indicate the through hole size or pin diameter. Before selecting a spherical rod eye please consult the information on the anti-rotation option for the GSX actuators. Spherical rod eyes will allow the rod to rotate if the load is not held.

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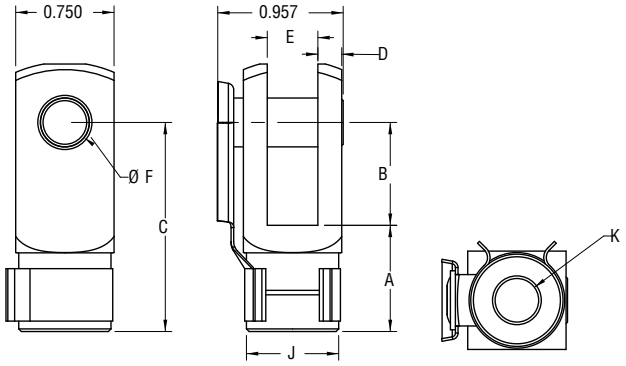
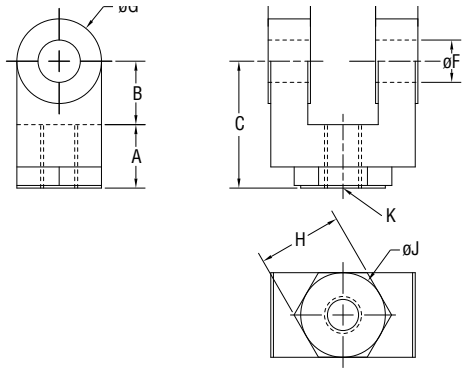
Rod Clevis



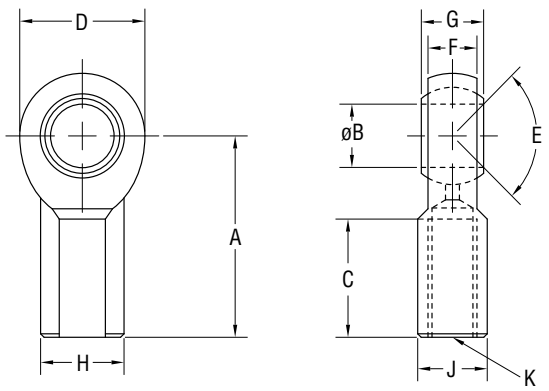
Dimensions for RC038



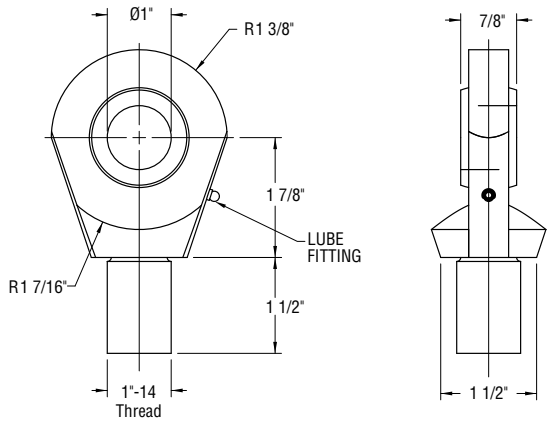
Dimensions for RC050, RC075, RC100, RC138

	A	B	C	D	E	øF	øG	H	øJ	K
GSX20 RC038 in (mm)	0.810 (20.6)	0.785 (19.9)	1.595 (40.5)	0.182 (4.6)	0.386 (9.8)	0.373 (9.5)	0.951 (24.2)	NA	NA	3/8-24
GSX30 RC050 in (mm)	0.75 (19.1)	0.75 (19.1)	1.50 (38.1)	0.50 (12.7)	0.765 (19.43)	0.50 (12.7)	1.00 (25.4)	1.00 (25.4)	1.00 (25.4)	7/16-20
GSX40 RC075 in (mm)	1.125 (28.58)	1.25 (31.75)	2.375 (60.3)	0.625 (15.88)	1.265 (32.13)	0.75 (19.1)	1.50 (38.1)	1.25 (31.75)	1.25 (31.75)	3/4-16
GSX50 RC100 in (mm)	1.625 (41.2)	1.500 (38.1)	3.125 (79.4)	0.750 (19.1)	1.515 (38.5)	1.000 (25.4)	2.000 (50.8)	1.500 (38.1)	1.500 (38.1)	1-14
GSX60 RC138 in (mm)	2.00 (50.8)	2.125 (53.98)	4.125 (104.78)	1.00 (25.4)	2.032 (51.6)	1.375 (34.93)	2.75 (69.85)	2.00 (50.8)	2.00 (50.8)	1-1/4 - 12

Spherical Rod Eye Dimensions



Dimensions for SRM038, SRM044, SRM075



Dimensions for SRF100

	A	øB	C	D	E	F	G	H	J	K
GSX20 SRM038 in (mm)	1.625 (41.3)	.375 (9.525)	.906 (23.0)	1.0 (25.6)	12 deg	.406 (10.3)	.500 (12.7)	.688 (17.7)	.562 (14.3)	3/8-24
GSX30 SRM044 in (mm)	1.81 (46.0)	0.438 (11.13)	1.06 (26.9)	1.13 (28.7)	14 deg	0.44 (11.1)	0.56 (14.2)	0.75 (19.1)	0.63 (16.0)	7/16-20
GSX40 SRM075 in (mm)	2.88 (73.2)	0.75 (19.1)	1.72 (43.7)	1.75 (44.5)	14 deg	0.69 (17.5)	0.88 (22.3)	1.13 (28.7)	1.00 (25.4)	3/4-16
GSX50 SRF100 in (mm)	See GSX50 Special Rod Eye drawing to the right above. Requires female rod end.									

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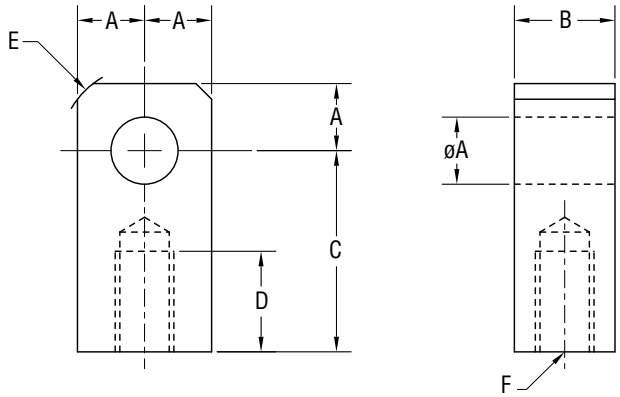
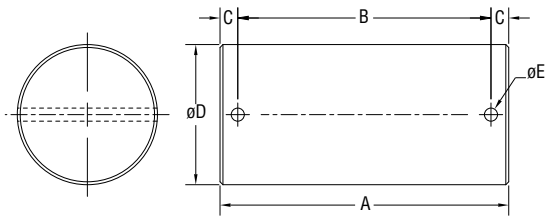
Rod Eye



	øA	B	C	D	E	F
GSX20 RE038 in (mm)	0.50 (12.7)	0.560 (14.2)	1.000 (25.4)	0.500 (12.7)	0.25 x 45˚	3/8 - 24
GSX30 RE050 in (mm)	0.50 (12.7)	0.75 (19.1)	1.50 (38.1)	0.75 (19.1)	0.63 (15.9)	7/16 - 20
GSX40 RE075 in (mm)	0.75 (19.1)	1.25 (31.8)	2.06 (52.3)	1.13 (28.7)	0.88 (22.3)	3/4 - 16
GSX50 RE100 in (mm)	1.00 (25.4)	1.50 (38.1)	2.81 (71.4)	1.63 (41.4)	1.19 (30.2)	1 - 14
GSX60 RE138 in (mm)	1.375 (34.93)	2.0 (50.8)	3.44 (87.3)	2.0 (50.8)	1.837 (46.67)	1 1/4 - 12

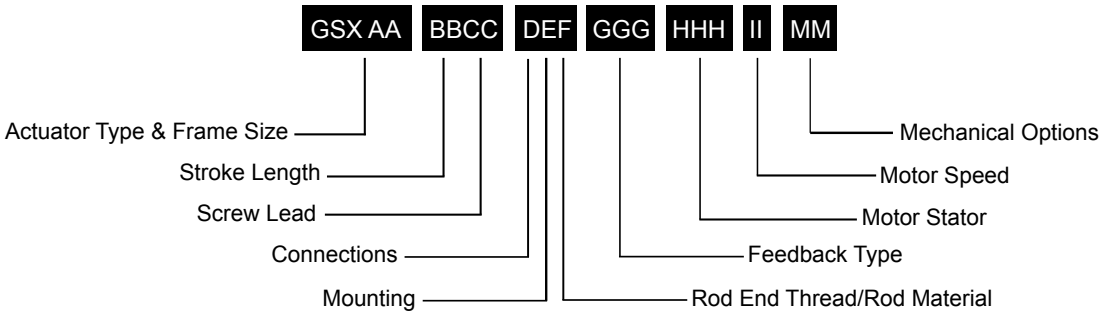
Clevis Pin Dimensions



	A	B	C	øD	øE
CP050 [1] in (mm)	2.28 (57.9)	1.94 (49.28)	0.17 (4.32)	0.50" -0.001/-0.002 (12.7 mm +0.00/-0.05)	0.106 (2.69)
CP075 [2] in (mm)	3.09 (78.5)	2.72 (69.1)	0.19 (4.82)	0.75 -0.001/-0.002 (19.1 mm +0.00/-0.05)	0.14 (3.56)
CP100 [3] in (mm)	3.59 (91.2)	3.22 (81.8)	0.19 (4.82)	1.00 -0.001/-0.002 (25.4 mm +0.00/-0.05)	0.14 (3.56)
CP138 [4] in (mm)	4.66 (118.3)	4.25 (108)	0.20 (5.08)	1.375 -0.001/-0.002 (34.93 mm +0.00/-0.05)	0.173 (4.39)
CP175 [5] in (mm)	5.656 143.6)	5.25 (133.3)	0.203 (5.15)	1.750 -0.001/-0.002 (4.44 mm +0.00/-0.05)	0.173 (4.39)

[1] Fits GSX20 and GSX30 rear clevis, RCI050 and REI050
[2] Fits GSX30, 40 and RC075, RE075 and SMR075
[3] Fits GSX50 rear clevis, RC100, RE100
[4] Fits RC138, RE138
[5] Fits GSX60 rear clevis

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.



AA = GSX Actuator Frame Size (Nominal)
20 = 2 in (60 mm)
30 = 3 in (80 mm)
40 = 4 in (100 mm)
50 = 5.5 in (140 mm)
60 = 7 in (180 mm)

BB = Stroke Length
03 = 3 in (76 mm) GSX20, GSX30
04 = 4 in (102 mm) GSX40
06 = 5.9 in (150 mm) GSX30; 6 in (152 mm) GSX20, GSX40, GSX50, GSX60
08 = 8 in (203 mm) GSX40
10 = 10 in (254 mm) all models
12 = 12 in (305 mm) GSX20, GSX30, GSX40
14 = 14 in (356 mm) GSX30, GSX50
18 = 18 in (457 mm) GSX30, GSX40

CC = Screw Lead
01 = 0.1 in (2.54 mm) (GSX20, GSX30, GSX40, GSX50)[10]
02 = 0.2 in (5.08 mm) (GSX20, GSX30, GSX40, GSX50)
03 = 0.25 in (6.35 mm) (GSX60)
04 = 0.4 in (10.16 mm) (GSX20 only)
05 = 0.5 in (12.7 mm) (GSX30, GSX40, GSX50, GSX60)
08 = 0.75 in (19.05 mm) (GSX40)[6]
10 = 1.0 in (25.4 mm) (GSX50, GSX60)[7]

D = Connections
I = Exlar standard M23 style [8]
M = Manufacturer's connector [4]
J = Embedded leads with "I" plug, 3 ft. standard

E = Mounting
C = Rear clevis
F = Front flange
R = Rear flange
D = Double side mount [18]
T = Side trunnion
E = Extended tie rods
K = Metric double side mount [18]
Q = Metric side trunnion
M = Metric extended tie rods
G = Metric rear clevis

F = Rod End Thread / Rod Material
M = Male, US standard thread
A = Male, metric thread
F = Female, US standard thread
B = Female, metric thread
W = Male, US standard thread SS [17]
R = Male, metric thread SS [17]
V = Female, US standard thread SS [17]
L = Female, metric thread SS [17]

GGG = Feedback Type
See page 207 for detailed information.

HHH = Motor Stator – 8 Pole [2] Class 180H [15]

118 = 1 stack	115 Vrms	158 = 1 stack	400 Vrms
218 = 2 stack		258 = 2 stack	
318 = 3 stack		358 = 3 stack	
138 = 1 stack	230 Vrms	168 = 1 stack	460 Vrms
238 = 2 stack		268 = 2 stack	
338 = 3 stack		368 = 3 stack	

II = Motor Speed
24 = 2400 rpm, GSX50, GSX60
30 = 3000 rpm, GSX30, GSX40
50 = 5000 rpm, GSX20

MM = Mechanical Options [20]
PF = Preloaded follower [1]
AR = External anti-rotate assembly [14]
RB = Rear electric brake [3]
HW = Manual drive, Handwheel with interlock switch [11, 16]
PB = Protective bellows [12]
SR = Splined main rod [9, 15, 19]
L1/L2/L3 = External limit switches [5]

NOTES:
1. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw. Preloaded follower is not available with absolute linear (LT) internal feedback option.
2. Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements. Refer to performance specification on pages 9-11 for availability of 3 stack stator.
3. The brake option may require a third cable, consult local sales representative.
4. Available as described in Feedback Types.
5. Requires AR option.
6. 0.75 lead not available above 12 inch.
7. 1.0 lead not available above 10 inch stroke.
8. GSX60 uses M40 size 1.5 power connector.
9. If not otherwise specified by the customer, an M24X2 male rod end will be used on the GSX50. See note on page 26.
10. 0.1 lead not available over 10" stroke on GSX50.
11. Not available on GSX20.
12. N/A with extended tie rod mounting option.
13. Force, torque and current ratings are reduced 25% with this option.
14. A second anti-rotate arm is used on GSX20, 30 and 40 for 10 inch and longer stroke.
15. See page 24 for optimized stator offerings.
16. N/A with holding brake unless application details are discussed with your local sales representative.
17. Consult your local sales representative if ordering splined stainless steel main rod.
18. Anti-rotate with D or K mount N/A on 10 inch or longer stroke except in GSX50.
19. Not available in Stainless Steel.
20. For extended temperature operation consult factory for model number.

For cables and accessories, see page 202.

For options or specials not listed above or for extended temperature operation, please contact Exlar

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GSM SERIES

INTEGRATED SERVO MOTOR AND ACTUATOR

Economical alternative to GSX

Standard capacity screw

GSM Series

Standard Capacity Roller Screw Technology

Description

This design incorporates superior roller screw technology with an integral brushless servo motor for medium to high performance motion control applications. The GSM Series offers 5 times the travel life and a smaller package with higher speed and higher load capacity than ball screws and other traditional rotary-to-linear conversion mechanisms. These features make the GSM Series an excellent replacement for ball screw actuators.

Selection of the proper feedback configuration allows GSM Series actuators to be powered by nearly any brand of brushless motor amplifier on the market. This flexibility allows these actuators to be incorporated into the highest performance single and multi-axis motion control systems in use today. In applications varying from food and beverage packaging, to multi-axis turning centers, to aircraft assembly, the GSM Series shows incredible performance and durability.

Feature	Standard	Optional
External anti-rotate mechanism	No	Yes
Internal Anti-rotate Mechanism	No	Yes
Pre-loaded follower	No	Yes
Electric brake	No	Yes
External End Switches	No	Yes
Connectors	Right Angle, Rotatable	Custom Connectors
Mounting Style	Extended Tie Rods, Side Tapped Mounting Holes, Trunnion, Rear Clevis, Front or Rear Flange	Custom Mountings
Rod End	Male or Female: U.S. Standard or Metric	Specials Available To Meet OEM Requirements
Lubrication	Greased, Oil Connection Ports are Built-in for Customer Supplied Recirculated Oil Lubrication	Specials Available To Meet OEM Requirements
Primary Feedback	Standard Encoders or Resolvers to Meet Most Amplifier Requirements	Custom Feedback

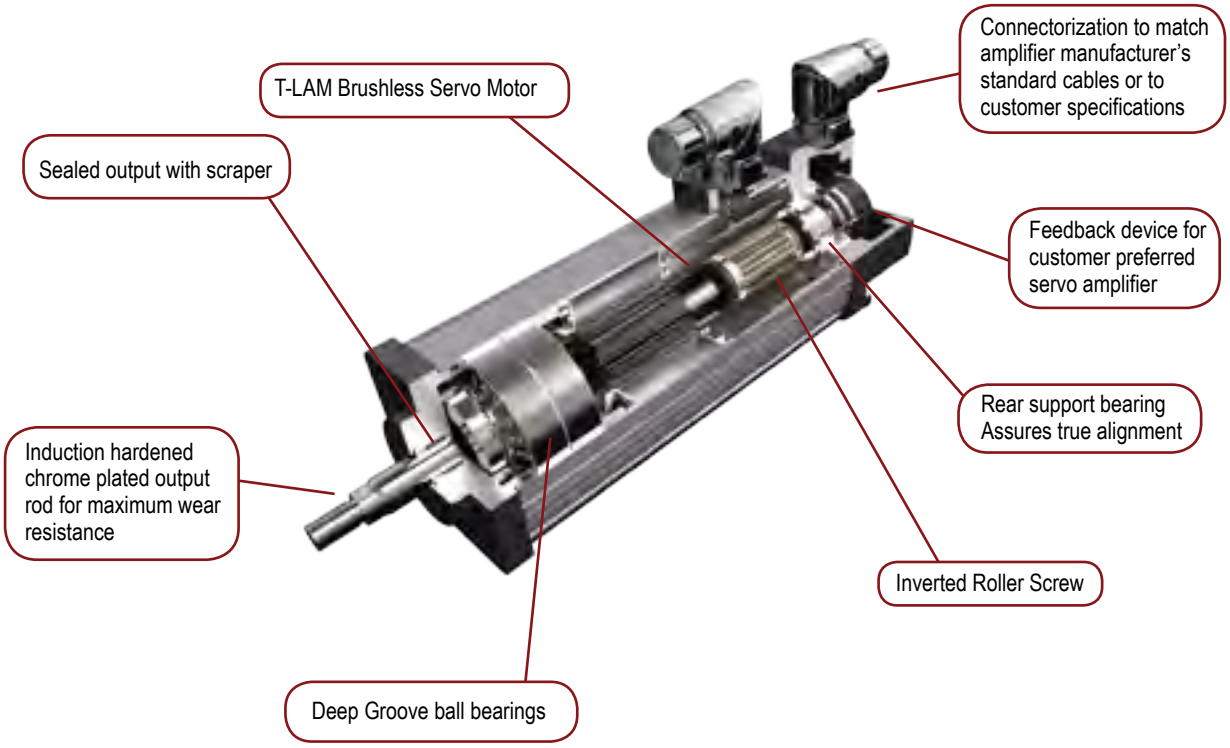
Technical Characteristics	
Frame Sizes in (mm)	2.25 (60), 3.3 (80), 3.9 (100)
Screw Leads in (mm)	0.1 (2.54), 0.2 (5.08), 0.4 (10.16), 0.5 (12.7), 0.75 (19.05)
Standard Stroke Lengths in (mm)	3 (76), 4 (102), 6 (152), 8 (203), 10 (254), 12 (305), 14 (356), 18 (457)
Force Range	103 to 3,457 lbf (458 to 15.3 kN)
Maximum Speed	Up to 37.5 in/sec (952 mm/sec) linear speeds

Operating Conditions and Usage		
Accuracy:		
Screw Lead Error	in/ft	0.001
Screw Lead Variation	in	0.0012
Screw Lead Backlash	in	0.008 maximum
Ambient Conditions:		
Standard Ambient Temperature	°C	0 to 65
Extended Ambient Temperature*	°C	-30 to 65
Storage Temperature	°C	-40 to 85
IP Rating		IP54S
Vibration**		3.5 grms; 5 to 500 hz

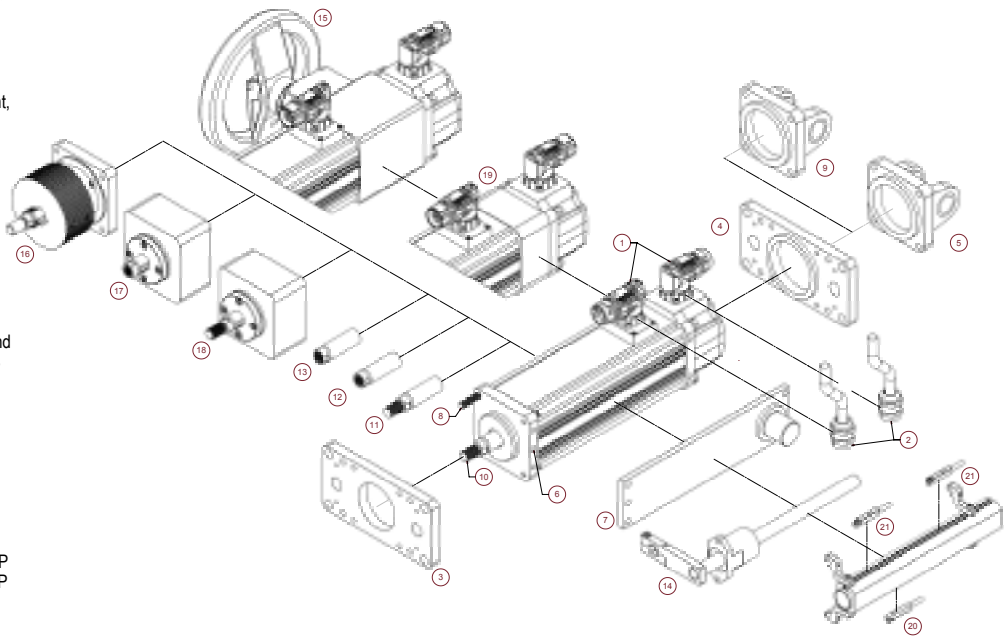
* Consult Exlar for extended temperature operations
** Resolver feedback

Ratings at 25°C, operation over 25°C requires de-rating.

Product Features



1 - Exlar standard M23 style and manufacturer's connector
2 - Embedded leads 3 ft. standard*
3 - Front flange and rear flange*
4 - Male metric thread SS and female, metric thread
5 - Rear clevis
6 - Side mount*, double side mount, metric side mount*, and metric double side mount
7 - Side trunnion and metric side trunnion
8 - Extended tie rods and metric extended tie rods
9 - Metric rear clevis
10 - Male, US standard thread and male, US standard thread SS
11 - Male, metric thread and male metric thread SS
12 - Female, US standard thread and female, US standard thread SS
13 - Female, metric thread and female, metric thread SS
14 - External anti-rotate
15 - Manual drive, handwheel with interlock switch
16 - Protective bellows
17 - Splined main rod- Female
18 - Splined main rod - Male
19 - Rear brake
20 - External limit switch - N.O., PNP
21 - External limit switch - N.C., PNP



* Consult Factory

Industries and Applications:

Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement

Automotive
- Parts Clamping
- Automated Assembly

Food Processing
- Sealing
- Dispensing
- Forming
- Pick and Place Systems
- Fillers
- Cutting / Slicing / Cubing

Process Control
- Control Valves
- Conveyor Diverters / Gates
- Dampers
- Pilot Valves

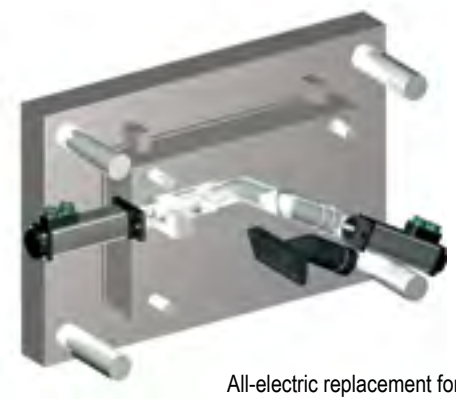
Entertainment / Simulation
- Robot Manipulator Arms
- Test Stands

Medical Equipment
- Volumetric Pumps
- Patient Positioning

Plastics
- Cutoffs
- Die Cutters
- Molding
- Formers

Material Handling
- Open / Close Doors
- Automated Flexible Fixturing
- Automatic Tool Changers
- Tension Control
- Web Guidance
- Wire Winding

A typical 3 inch stroke GSM Series actuator used in a valve-modulating application can control position to +/– 0.5% and fully open or close in less than 200 mSec.



All-electric replacement for hydraulic cylinders improves throughput with servo control and lower maintenance for core-pull cylinders.

Mechanical Specifications

GSM20

Model No. (Motor Stacks)		1 Stack			2 Stack		
Screw Lead Designator		**01**	**02**	**04**	**01**	**02**	**04**
Screw Lead	in	0.1	0.2	0.4	0.1	0.2	0.4
	mm	2.54	5.08	10.16	2.54	5.08	10.16
Continuous Force *(Motor Limited)*	lbf	367	195	103	578	307	163
	N	1632	867	459	2571	1366	723
Max Velocity	in/sec	8.3	16.8	33.3	8.3	16.8	33.3
	mm/sec	211.7	423.3	846.7	211.7	423.3	846.7
Friction Torque *(standard screw)*	in-lbf	1.0			1.1		
	N-m	0.12			0.12		
Friction Torque *(preloaded screw)*	in-lbf	1.25			1.25		
	N-m	0.14			0.14		
Back Drive Force [1]	lbf	110	60	30	110	60	30
	N	490	270	135	490	270	135
Min Stroke	in	3			3		
	mm	76			76		
Max Stroke	in	12			12		
	mm	305			305		
C_a (Dynamic Load Rating)	lbf	1568	1219	738	1568	1219	738
	N	6970	5422	3283	6970	5422	3283
Inertia *(zero stroke)*	lb-in-s^2	0.0007758			0.0008600		
	Kg-m^2	0.0000008766			0.0000009717		
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.00004667					
	Kg-m^2/mm	0.00000005273					
Weight *(zero stroke)*	lb	4.5			5.0		
	Kg	2.04			2.27		
Weight Adder *(per unit of stroke)*	lb	0.5					
	Kg	0.23					

GSM30

Model No. (Motor Stacks)		1 Stack)			2 Stack		
Screw Lead Designator		**01**	**02**	**05**	**01**	**02**	**05**
Screw Lead	in	0.1	0.2	0.5	0.1	0.2	0.5
	mm	2.54	5.08	12.7	2.54	5.08	12.7
Continuous Force *(Motor Limited)*	lbf	792	449	190	1277	724	306
	N	3521	1995	845	5680	3219	1363
Max Velocity	in/sec	5.0	10.0	25.0	5.0	10.0	25.0
	mm/sec	127.0	254.0	635.0	127.0	254.0	635.0
Friction Torque *(standard screw)*	in-lbf	1.5			1.7		
	N-m	0.17			0.19		
Friction Torque *(preloaded screw)*	in-lbf	1.75			1.75		
	N-m	0.20			0.20		
Back Drive Force [1]	lbf	180	80	40	180	80	40
	N	800	360	180	800	360	180
Min Stroke	in	3			3		
	mm	75			75		
Max Stroke	in	18			18		
	mm	457			457		
C_a (Dynamic Load Rating)	lbf	3310	3570	3016	3310	3570	3016
	N	14724	15880	13416	14724	15880	13416
Inertia *(zero stroke)*	lb-in-s^2	0.002655			0.002829		
	Kg-m^2	0.000003000			0.000003196		
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.0001424					
	Kg-m^2/mm	0.0000001609					
Weight *(zero stroke)*	lb	6.5			7.65		
	Kg	2.95			3.47		
Weight Adder *(per unit of stroke)*	lb	1.1					
	Kg	0.50					

[1] Back drive force is nominal value only. Operating conditions can cause wide variations in back drive force. Exlar cannot assure that an actuator will or will not back drive.

GSM40

Model No. (Motor Stacks)		1 Stack)				2 Stack			
Screw Lead Designator		**01**	**02**	**05**	**08**	**01**	**02**	**05**	**08**
Screw Lead	in	0.1	0.2	0.5	0.75	0.1	0.2	0.5	0.75
	mm	2.54	5.08	12.7	19.05	2.54	5.08	12.7	19.05
Continuous Force *(Motor Limited)*	lbf	2089	1194	537	358	3457	1975	889	593
	N	9293	5310	2390	1593	15377	8787	3954	2636
Max Velocity	in/sec	5.0	10.0	25.0	37.5	5.0	10.0	25.0	37.5
	mm/sec	127.0	254.0	635.0	953.0	127.0	254.0	635.0	953.0
Friction Torque *(standard screw)*	in-lbf	2.7				3.0			
	N-m	0.31				0.34			
Friction Torque *(preloaded screw)*	in-lbf	3.0				3.0			
	N-m	0.34				0.34			
Back Drive Force [1]	lbf	380	150	60	50	380	150	60	50
	N	1700	670	270	220	1700	670	270	220
Min Stroke	in	4				4			
	mm	102				102			
Max Stroke	in	18			12	18			12
	mm	457				457			
C_a (Dynamic Load Rating)	lbf	4736	4890	4218	3328	4736	4890	4218	3328
	N	21067	21751	18763	14804	21067	21751	18763	14804
Inertia *(zero stroke)*	lb-in-s^2	0.01132				0.01232			
	Kg-m^2	0.000012790				0.00001392			
Inertia Adder *(per unit of stroke)*	lb-in-s^2/in	0.0005640							
	Kg-m^2/mm	0.0000006372							
Weight *(zero stroke)*	lb	8.0				11.3			
	Kg	3.63				5.13			
Weight Adder *(per unit of stroke)*	lb	2.0							
	Kg	0.91							

[1] Back drive force is nominal value only. Operating conditions can cause wide variations in back drive force. Exlar cannot assure that an actuator will or will not back drive.

DEFINITIONS:

Continuous Force: The linear force produced by the actuator at continuous motor torque.

Max Velocity: The linear velocity that the actuator will achieve at rated motor rpm.

Friction Torque (standard screw): Amount of torque required to move the actuator when not coupled to a load.

Friction Torque (preloaded screw): Amount of torque required to move the actuator when not coupled to a load.

Back Drive Force: Amount of axial force applied to the rod end of the actuator that will produce motion with no power applied to the actuator.

Min Stroke: Shortest available stroke length.

Max Stroke: Longest available stroke length.

C_a (Dynamic Load Rating): A design constant used when calculating the estimated travel life of the roller screw.

Inertia (zero stroke): Base inertia of an actuator with zero available stroke length.

Inertia Adder (per unit of stroke): Inertia per unit of stroke that must be added to the base (zero stroke) inertia to determine the total actuator inertia.

Weight (zero stroke): Base weight of an actuator with zero available stroke length.

Weight Adder (per unit of stroke): Weight adder per unit of stroke that must be added to the base (zero stroke) weight to determine the total actuator weight.

Electrical Specifications

GSM20

Motor Stator		118	138	158	168	218	238	258	268
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.0	11.3
	Nm	0.86	0.83	0.79	0.79	1.34	1.30	1.25	1.28
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	2.5	5.2	7.5	9.5	2.5	5.2	8.6	10.1
	Nm/A	0.28	0.59	0.85	1.07	0.28	0.59	0.97	1.15
Continuous Current Rating	A	3.4	1.6	1.0	0.8	5.4	2.5	1.4	1.2
Peak Current Rating	A	6.9	3.1	2.1	1.6	10.8	4.9	2.9	2.5
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	7.6	7.3	7.0	7.0	11.9	11.5	11.0	11.3
	Nm	0.86	0.83	0.79	0.79	1.34	1.30	1.25	1.28
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	1.7	3.7	5.3	6.7	1.7	3.7	6.1	7.2
	Nm/A	0.20	0.42	0.60	0.76	0.20	0.42	0.69	0.81
Continuous Current Rating	A	4.9	2.2	1.5	1.2	7.6	3.5	2.0	1.8
Peak Current Rating	A	9.7	4.5	2.9	2.3	15.2	7.0	4.1	3.5
MOTOR STATOR DATA									
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	16.9	35.5	51.5	64.8	16.9	35.5	58.6	69.3
	Vpk/Krpm	23.9	50.2	72.8	91.7	23.9	50.2	82.9	98.0
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.6	12.5	28.8	45.8	1.1	5.3	15.5	20.7
Inductance (L-L)(+/– 15%)	mH	4.6	21.4	47.9	68.3	2.5	10.2	28.3	39.5
Brake Inertia	lbf-in-sec^2	0.00012							
	Kg-cm^2	0.135							
Brake Current @ 24 VDC	A	0.33							
Brake Holding Torque	lbf-in	19							
	Nm	2.2							
Brake Engage/Disengage Time	ms	14/28							
Mechanical Time Constant (tm), ms	min	4.7	5.1	5.5	5.6	2.0	2.1	2.3	2.2
	max	6.6	7.2	7.9	7.9	2.8	3.0	3.3	3.1
Electrical Time Constant (te)	ms	1.8	1.7	1.7	1.5	2.2	1.9	1.8	1.9
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	5000							
Insulation Class		180 (H)							

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" at 25°C

Specifications subject to change without notice.

GSM30

Motor Stator		118	138	158	168	218	238	258	268
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	16.9	16.8	16.3	16.0	26.9	27.1	26.7	27.0
	Nm	1.91	1.90	1.84	1.81	3.04	3.06	3.01	3.05
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	4.4	8.7	15.5	17.5	4.4	8.7	15.5	17.5
	Nm/A	0.49	0.99	1.75	1.97	0.49	0.99	1.75	1.97
Continuous Current Rating	A	4.3	2.2	1.2	1.0	6.9	3.5	1.9	1.7
Peak Current Rating	A	8.6	4.3	2.4	2.0	13.8	6.9	3.8	3.4
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	16.9	16.8	16.3	16.0	26.9	27.1	26.7	27.0
	Nm	1.91	1.90	1.84	1.81	3.04	3.06	3.01	3.05
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	3.1	6.2	11.0	12.4	3.1	6.2	11.0	12.4
	Nm/A	0.35	0.70	1.24	1.40	0.35	0.70	1.24	1.40
Continuous Current Rating	A	6.1	3.0	1.7	1.4	9.7	4.9	2.7	2.4
Peak Current Rating	A	12.2	6.1	3.3	2.9	19.5	9.8	5.4	4.9
MOTOR STATOR DATA									
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	29.8	59.7	105.8	119.3	29.8	59.7	105.8	119.3
	Vpk/Krpm	42.2	84.4	149.7	168.7	42.2	84.4	149.7	168.7
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	2.7	10.8	36.3	47.9	1.1	4.4	14.1	17.6
Inductance (L-L)(+/– 15%)	mH	7.7	30.7	96.8	123.0	3.7	14.7	46.2	58.7
Brake Inertia	lbf-in-sec^2	0.00033							
	Kg-cm^2	0.38							
Brake Current @ 24 VDC	A	0.5							
Brake Holding Torque	lbf-in	70							
	Nm	8							
Brake Engage/Disengage Time	ms	19/29							
Mechanical Time Constant (tm), ms	min	4.9	4.9	5.2	5.4	2.0	2.0	2.0	2.0
	max	9.4	9.5	10.1	10.5	3.9	3.8	3.9	3.8
Electrical Time Constant (te)	ms	2.9	2.8	2.7	2.6	3.3	3.4	3.3	3.3
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000							
Insulation Class		180 (H)							

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 3/8" at 25°C

Specifications subject to change without notice.

GSM40

Motor Stator		118	138	158	168	218	238	258	268
RMS SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	47.5	47.5	45.9	45.4	75.1	78.6	78.7	79.5
	Nm	5.37	5.36	5.19	5.13	8.49	8.89	8.89	8.99
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	4.1	8.2	14.5	16.8	4.1	8.2	14.5	16.8
	Nm/A	0.46	0.93	1.64	1.90	0.46	0.93	1.64	1.90
Continuous Current Rating	A	12.9	6.5	3.5	3.0	20.5	10.7	6.0	5.3
Peak Current Rating	A	25.9	12.9	7.1	6.0	40.9	21.4	12.1	10.6
O-PK SINUSOIDAL COMMUTATION									
Continuous Motor Torque	lbf-in	47.5	47.5	45.9	45.4	75.1	78.6	78.7	79.5
	Nm	5.37	5.36	5.19	5.13	8.49	8.89	8.89	8.99
Torque Constant (Kt) (+/– 10% @ 25˚C)	lbf-in/A	2.9	5.8	10.3	11.9	2.9	5.8	10.3	11.9
	Nm/A	0.33	0.66	1.16	1.34	0.33	0.66	1.16	1.34
Continuous Current Rating	A	18.3	9.1	5.0	4.3	28.9	15.1	8.5	7.5
Peak Current Rating	A	36.6	18.3	10.0	8.6	57.9	30.3	17.1	15.0
MOTOR STATOR DATA									
Voltage Constant (Ke) (+/– 10% @ 25˚C)	Vrms/Krpm	28.0	56.0	99.3	114.6	28.0	56.0	99.3	114.6
	Vpk/Krpm	39.6	79.2	140.5	162.1	39.6	79.2	140.5	162.1
Pole Configuration		8	8	8	8	8	8	8	8
Resistance (L-L)(+/– 5% @ 25˚C)	Ohms	0.42	1.7	5.7	7.8	0.2	0.72	2.26	3.0
Inductance (L-L)(+/– 15%)	mH	3.0	11.9	37.5	49.9	1.2	5.4	18.2	23.1
Brake Inertia	lb-in-sec^2	0.00096							
	Kg-cm^2	1.08							
Brake Current @ 24 VDC	A	0.67							
Brake Holding Torque	bf-in	97							
	Nm	11							
Brake Engage/Disengage Time	ms	20/29							
Mechanical Time Constant (tm), ms	min	4.5	4.5	4.8	4.9	2.1	1.9	1.9	1.9
	max	6.0	6.0	6.4	6.6	2.8	2.6	2.6	2.5
Electrical Time Constant (te)	ms	7.0	7.0	6.6	6.4	5.9	7.5	8.0	7.8
Bus Voltage	Vrms	115	230	400	460	115	230	400	460
Speed @ Bus Voltage	rpm	3000							
Insulation Class		180 (H)							

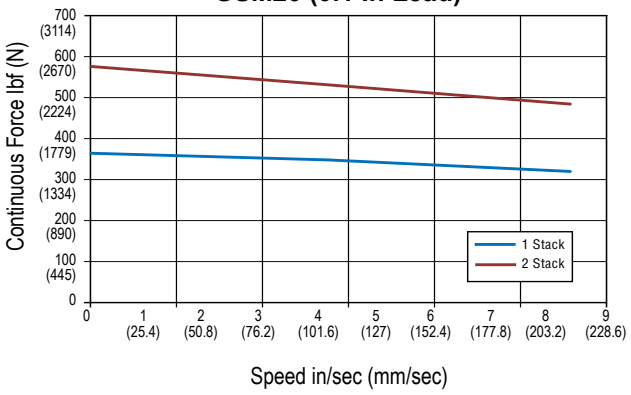
Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" at 25°C

Specifications subject to change without notice.

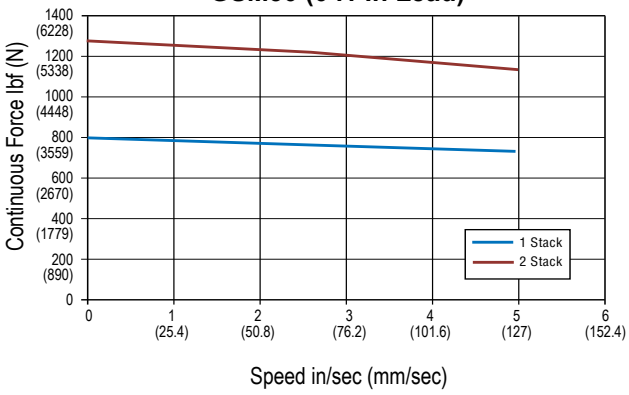
Performance Curves

The below speed vs. force curves represent approximate continuous thrust ratings at indicated linear speed. Different types of servo amplifiers will offer varying motor torque and actuator thrust. These values are at constant velocity and do not account for motor torque required for acceleration.

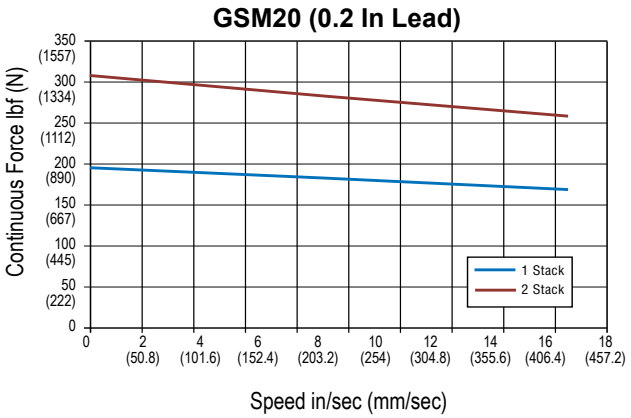
GSM20 (0.1 In Lead)



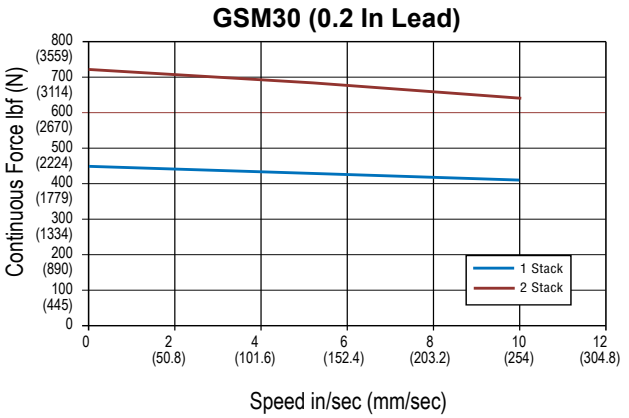
GSM30 (0 .1 In Lead)



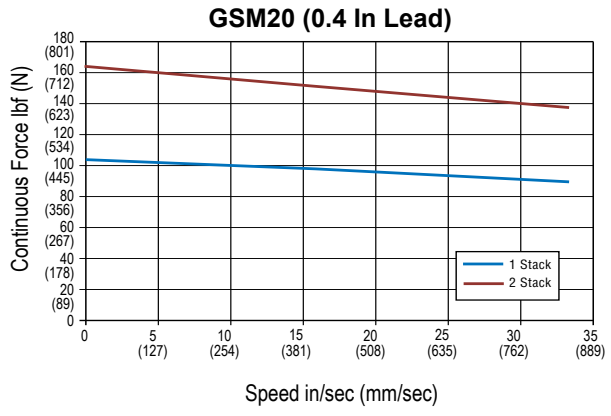
GSM20 (0.2 In Lead)



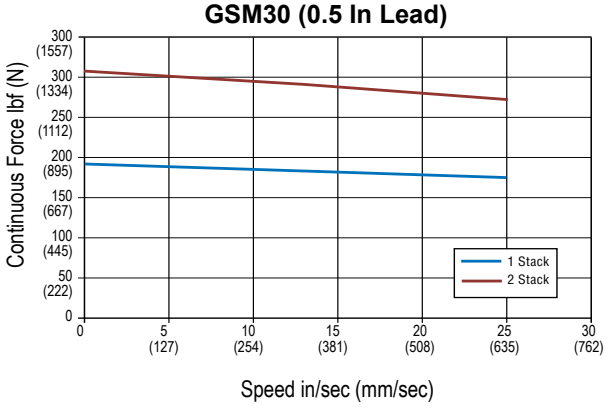
GSM30 (0.2 In Lead)



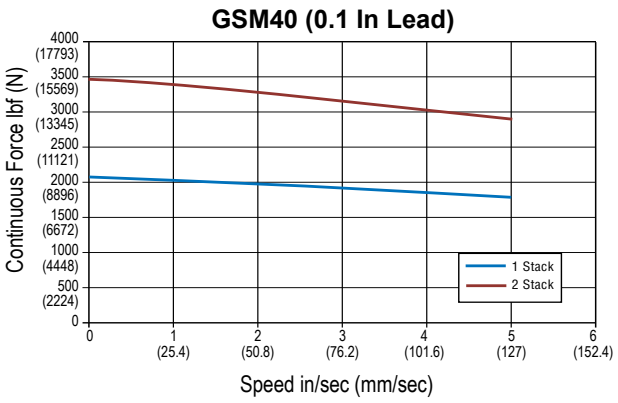
GSM20 (0.4 In Lead)

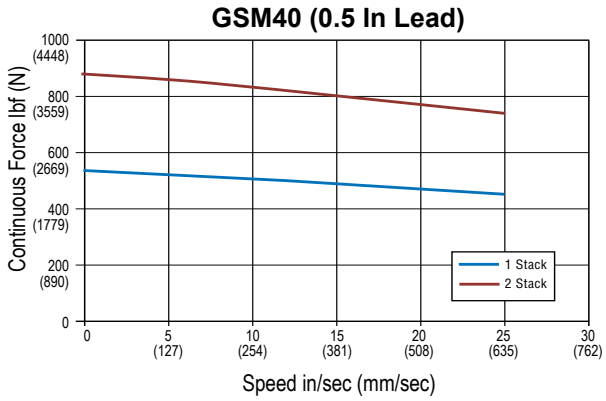


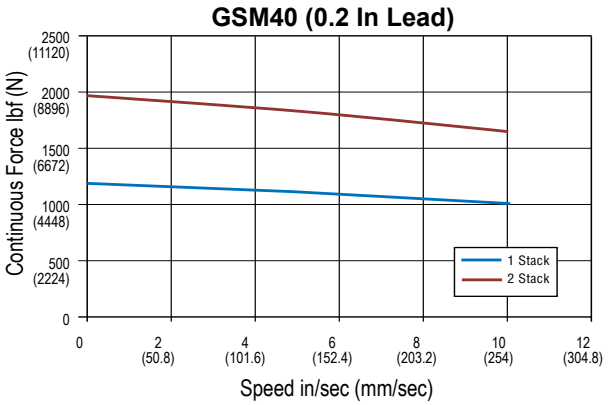
GSM30 (0.5 In Lead)

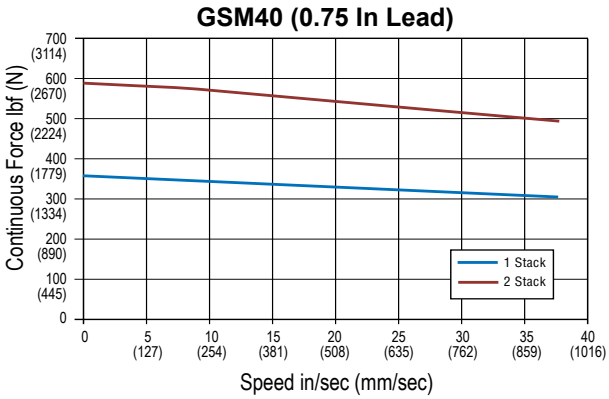


Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4"on GSM20 and 10" x 10" x 3/8" on GSM30



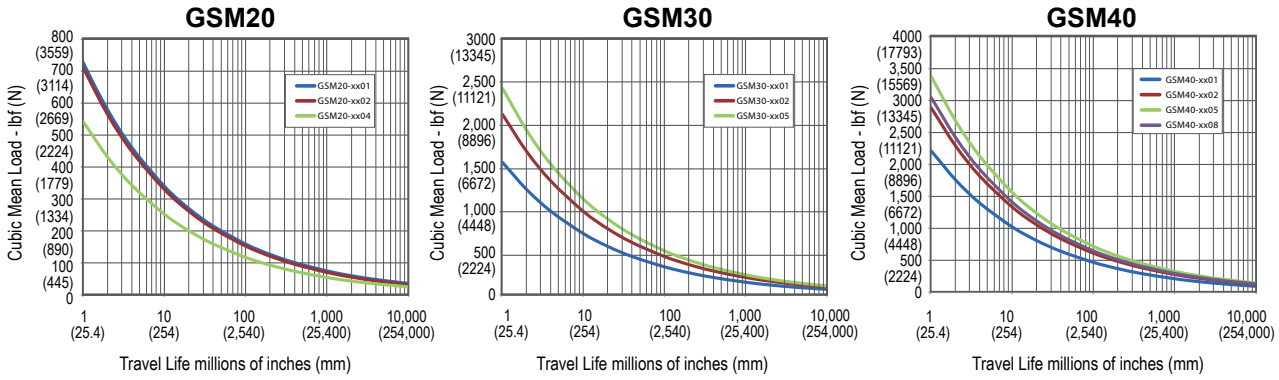






Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" on GSM40

Life Curves Estimated L_{10} Travel Life



See page 17 for Life Curve Information.
If your application requires high force over a stroke length shorter than the length of the nut, please contact Exlar for derated life calculations.
You may also download the article “Calculating Life Expectancy” at www.exlar.com.

Options

PF = Preloaded Follower

This option offers a true zero backlash follower for the GSM Series actuator. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw for the same application. Preloaded follower option includes angular contact bearings and is not available with LT Linear feedback option.

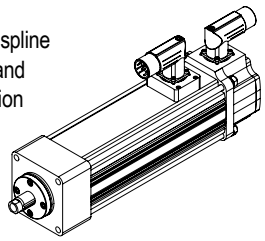
AR = External Anti-rotate Assembly

This option provides a rod and bushing to restrict the actuator rod from rotating when the load is not held by another method. Shorter actuators have single sided anti-rotation attachments. Longer lengths require attachments on both sides for proper operation. For AR dimensions, see page 30.

RB = Rear Electric Brake

This option provides an internal holding brake for the GSM Series actuators. The brake is spring activated and electrically released.

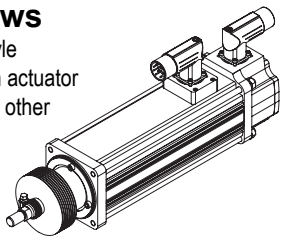
SR = Splined Main Rod



A ball spline shafting main rod with a ball spline nut that replaces the standard front seal and bushing assembly. This rod restricts rotation without the need for an external mechanism. The rod diameter will be the closest metric equivalent to our standard rod sizes. Since this option is NOT sealed, it is not suitable for environments in which contaminants may enter the actuator.

Note: Adding this option affects the overall length and mounting dimensions. Due to the reduced diameter of the splined main rod on GSX50 actuators, the standard A, F and B rod ends are not available. In this case, an “X” should be used in the rod end location. If not otherwise specified, an M24x2 male rod end will be used.

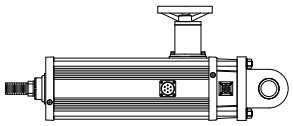
PB = Protective Bellows



This option provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the environment in which the actuator must survive. The standard material of this bellows is S2 Neoprene Coated Nylon, Sewn Construction. This standard bellows is rated for environmental temperatures of -40 to 250 degrees F. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative.

HW = Manual Drive, Handwheel

This option provides a manual drive handwheel on the side of the actuator. The handwheel has an engage/disengage lever that is tied to an interrupt switch. Not available on GSM20. Also not available with holding brake unless application details have been discussed with your local sales representative.



L1, L2, L3 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included with the GSM Series Actuator. These switches provide travel indication to the controller and are adjustable. See drawing on page 54. Must purchase external anti-rotate with this option.

Motor Speed

All Exlar T-LAM motors and actuators carry a standard motor speed designator (see chart). This is representative of the standard base speed of the motor for the selected bus voltage.

Designator	Base Speed	Actuator/ Motor Series
-50	5000 rpm	GSM20
-30	3000 rpm	GSM30, GSM40
01-99	Special Speed, consult your local sales representative	

If the model number is created and the location for the motor speed designator is left blank, this is the base speed to which the motor will be manufactured. The model number can also be created including this standard speed designator.

Exlar also provides the flexibility to manufacture all of its T-LAM products with special base speeds to match your exact application requirements. This may be a higher than standard speed motor, or lower base speed than standard which will allow you to get the required torque at a speed optimized to your application and use the minimum amount of current from your amplifier.

The call out for a special speed is configured in the model number by using a two digit code from 01-99. This code represents the number, in hundreds, of RPM that is the base speed for the particular motor.

For example, a GSM30-0301-MFM-EM2-138-30 motor that normally has a 3000 RPM standard winding can be changed to a 3300 RPM winding by changing the -30 to a -33. Similarly, it can be changed to a 5000 RPM winding by changing the -30 to a -50.

Changing this speed designator changes the ratings of the motor; these must be obtained from your local sales representative. Also, it is not possible to produce every possible speed from -01 to -99 for each motor at each voltage so please contact your local sales representative for confirmation of the speed that is desired for the application.

Feedback

Due to the variability in size of some feedback devices, especially absolute feedback devices which are often very large relative to the size of the actuator motor, the actual size of the actuator may differ in length and width from these drawings for feedback types other than standard resolvers and standard encoders. Please consult your local sales representative. In the event that you order an actuator that differs from these standard dimensions, you will be sent a drawing of the final configuration of your actuator for approval.

Motor Stators

GSM motor options are described with a 3 digit code. The first digit calls out the stack length, the second digit signifies the rated bus voltage, and the third digit identifies the number of poles of the motor. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

118	1 stack	115 Vrms	8 Pole	Class 180 H
138		230 Vrms		
158		400 Vrms		
168		460 Vrms		
1A8*		24 VDC		
1B8*		48 VDC		
1C8*		120 VDC		
218	2 stack	115 Vrms	8 Pole	Class 180 H
238		230 Vrms		
258		400 Vrms		
268		460 Vrms		
2A8*		24 VDC		
2B8*		48 VDC		
2C8*		120 VDC		

Note: 3 stack not available in GSM Series

* Low voltage stators may be limited to less than catalog rated torque and/or speed. Please contact your local sales representative when ordering this option.

Rod End Attachments

Rear Clevis Pin **Spherical Rod Eye**
Rod Eye **Rod Clevis**

See drawings on pages 53-54.
Attachments ordered separate from actuator.

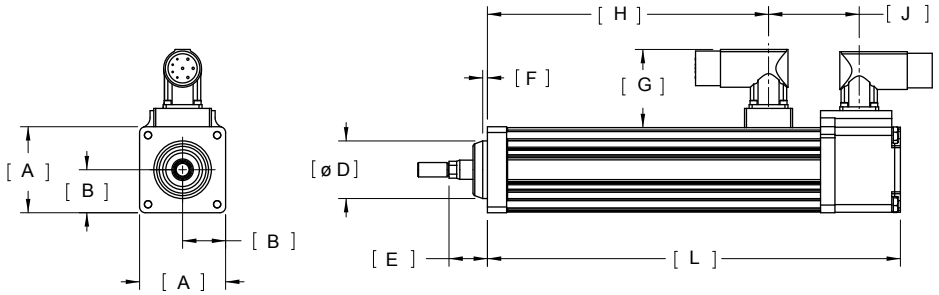
Housing Options

P5 = IP65S Sealing Option

Please read full description of IP Ratings in the engineering reference in the back of the book.

Dimensions

Base Actuator



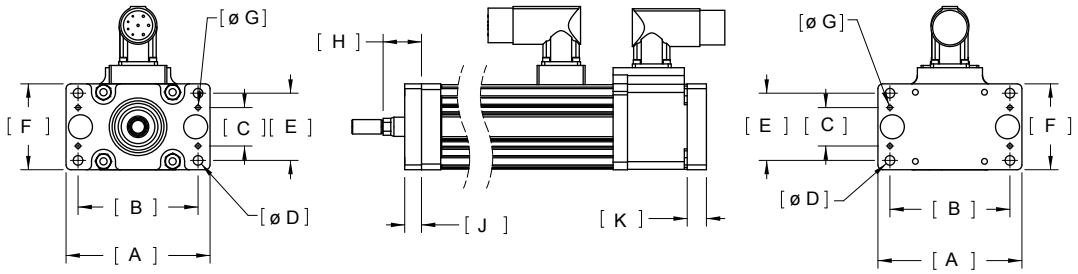
		GSM20	GSM30	GSM40
A	in	2.24	3.05	3.90
	mm	56.9	77.4	99.1
B	in	1.12	1.52	1.95
	mm	28.4	38.7	49.5
Ø D	in	1.500 +0.000/-0.003	2.000 +0.000/-0.003	2.500 +0.000/-0.003
	mm	38.10 0.00/0.08	50.80 0.00/0.08	63.50 0.00/0.08
E [5]	in	1.00	1.32	1.65
	mm	25.4	33.5	41.9
F	in	0.12	0.31	0.10
	mm	3.1	8.0	2.5
G	in	2.04	2.04	2.04
	mm	51.7	51.7	51.7
H (zero stroke)	in	1.3	1.5	2.9
	mm	34	38	73
J [4]	in	2.36	2.63	2.63
	mm	60.0	66.7	66.7
L [4] **(zero stroke)**	in	4.8	5.2	6.6
	mm	122	133	167

1. Dimensions shown are for referencing only and are subject to change
2. Dimensions reflect Exlar standard M23 style connectors (option I)
3. Dimensions may vary based on options selected. Consult Exlar for details or refer to drawings provided after receipt of order
4. If ordering a brake, add the following to dimensions J and L:
   GSM20 add 1.78 in (45.2 mm)
   GSM30 add 1.60 in (40.6 mm)
   GSM40 add 2.33 in (59.2 mm)
5. If ordering bellows add 2 in (50.8 mm) to dimension E.

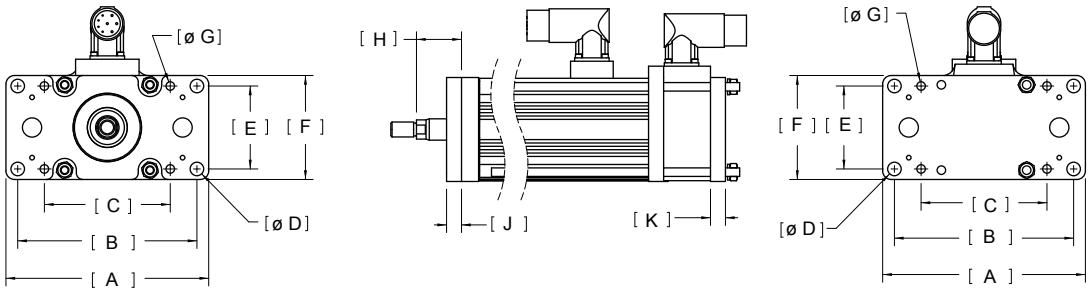
Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Front or Rear Flange Mount

GSM20



GSM30, GSM40

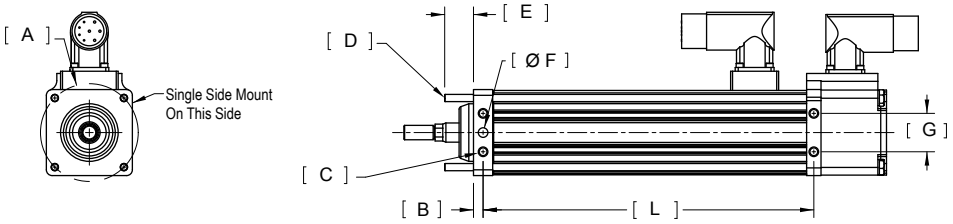


		GSM20	GSM30	GSM40
A	in	3.75	5.94	7.68
	mm	95.3	150.9	195.1
B	in	3.13	5.25	6.80
	mm	79.4	133.4	172.7
C	in	1.00	3.69	5.25
	mm	25.4	93.7	133.4
Ø D	in	0.250	0.397	0.516
	mm	6.35	10.08	13.10
E	in	1.75	2.43	2.92
	mm	44.5	61.7	74.2
F	in	2.24	3.05	3.80
	mm	56.8	77.4	96.5
Ø G	in	0.125 +0.001/-0.000	0.250 ±0.0005	0.250 ±0.001
	mm	3.18 +0.03/0.00	6.35 ±0.13	6.35 ±0.025
H [1]	in	1.00	1.32	1.65
	mm	25.4	33.5	41.9
J [1]	in	0.44	0.44	0.63
	mm	11.1	11.1	15.9
K	in	0.50	0.44	0.63
	mm	12.7	11.1	15.9

1. If ordering a splined main rod, add the following to dimensions H and J:
   GSM20 add .50 in (12.7 mm)
   GSM30 add 1.20 in (30.5 mm)
   GSM40 add 1.77 in (45.0 mm)

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Side Mount or Extended Tie Rod Mount

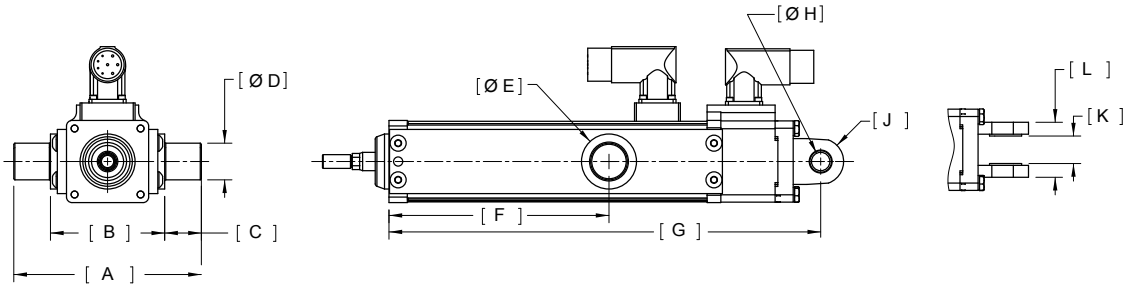


		GSM20	GSM30	GSM40
Ø A	in	2.546	3.536	4.243
	mm	64.66	89.80	107.76
B [2]	in	0.25	0.25	0.31
	mm	6.4	6.4	7.9
C [1]	in	1/4-20 UNC	1/4-20 UNC	3/8-16 UNC
	mm	M6 x 1.0	M6 x 1.0	M10 x 1.5
D	in	10-24 UNC	1/4-20 UNC	3/8-16 UNC
	mm	M5 x 0.8	M6 x 1.0	M8 x 1.25
E	in	0.75	0.96	1.38
	mm	19.1	24.4	35.1
Ø F	in	0.2500 +0/-0.0005↧0.25	0.2500 +0/-0.0005↧0.25	0.3750 +0/-0.0005↧0.44
	mm	6 M7↧9.0	6 M7↧9.5	8 M7↧12.0
G	in	1.00	1.75	1.75
	mm	25.4	44.5	44.5
L (zero stroke)	in	2.6	3.1	4.3
	mm	67	80	109

1. Side mount options S and J = 4X, D and K = 8X for dimension C
2. If ordering a splined main rod, add the following to dimension B:
   GSM20 add .50 in (12.7 mm)
   GSM30 add 1.20 in (30.5 mm)
   GSM40 add 1.77 in (45.0 mm)

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Side Trunnion Mount of Rear Clevis Mount

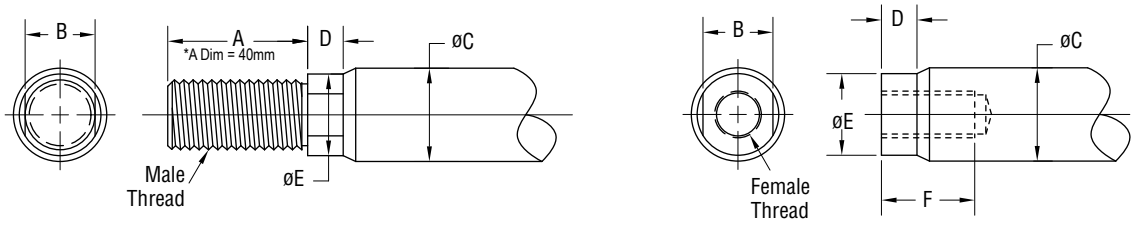


		GSM20	GSM30	GSM40
A	in	5.12	5.92	6.90
	mm	129.9	150.4	175.2
B	in	3.12	3.92	4.90
	mm	79.1	99.6	124.4
C	in	1.00	1.00	1.00
	mm	25.4	25.4	25.4
Ø D	in	1.000 +/-0.001	1.000 +/-0.001	1.500 +/-0.001
	mm	25 h7	25 h7	35 h7
Ø E	in	1.50	1.50	2.00
	mm	38.1	38.1	50.8
F (3" stroke)	in	3.0	5.4	NA
	mm	76	137	NA
F (4" stroke)	in	NA	NA	4.0
	mm	NA	NA	102
F (6" stroke)	in	6.0	8.0	6.0
	mm	152	203	152
F (8" stroke)	in	NA	NA	8.0
	mm	NA	NA	203
F (10" stroke)	in	10.0	10.0	10.0
	mm	254	254	254
F (12" stroke)	in	12.0	12.0	12.0
	mm	305	305	305
F (14" stroke)	in	NA	14.0	NA
	mm	NA	406	NA
F (18" stroke)	in	NA	18.0	18.0
	mm	NA	457	457
G [1] (zero stroke)	in	5.8	6.5	8.3
	mm	147	165	210
Ø H	in	0.500 +0.002/-0.001	0.750 +0.002/-0.001	0.750 +0.002/-0.001
	mm	12 +0.01/-0.06	20 +0/-0.07	20 +0/-0.07
J	in	0.63	0.75	0.75
	mm	15.9	19.1	19.1
K	in	1.50	2.50	2.50
	mm	38.1	63.5	63.5
L	in	0.75	1.25	1.25
	mm	19.1	31.8	31.8

1. If ordering a brake, add the following to dimension G: GSM20 add 1.78 in (45.2 mm), GSM30 add 1.60 in (40.6 mm), GSM40 add 2.33 in (59.2 mm)

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Actuator Rod End Options



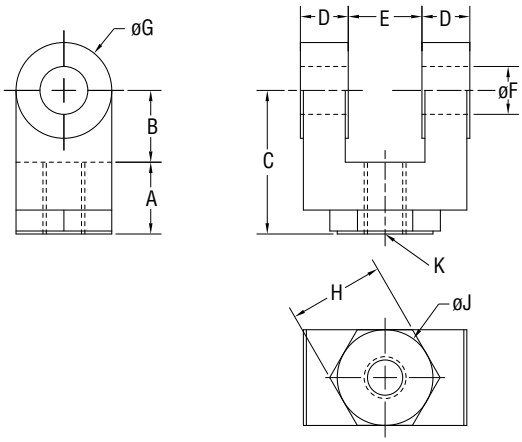
Standard Rod Ends

	A	B	ØC	D	ØE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
GSM20 in (mm)	0.813 (20.7)	0.375 (9.5)	0.500 (12.7)	0.200 (5.1)	0.440 (11.2)	0.750 (19.1)	3/8 – 24 UNF – 2A	M8 x 1 6g	5/16 – 24 UNF – 2B	M8 x 1 6h
GSM30 in (mm)	0.750 (19.1)	0.500 (12.7)	0.625 (15.9)	0.281 (7.1)	0.562 (14.3)	0.750 (19.1)	7/16 – 20 UNF– 2A	M12 x 1.75* 6g	7/16 – 20 UNF – 2B	M10 x 1.5 6h
GSM40 in (mm)	1.500 (38.1)	0.750 (19.1)	1.000 (25.4)	0.381 (9.7)	0.875 (22.2)	1.000 (25.4)	3/4 – 16 UNF – 2A	M16 x 1.5 6g	5⁄8 – 18 UNF – 2B	M16 x 1.5 6h

Part numbers for rod attachment options indicate the through hole size or pin diameter. Before selecting a spherical rod eye please consult the information on the anti-rotation option for the GSM actuators. Spherical rod eyes will allow the rod to rotate if the load is not held.

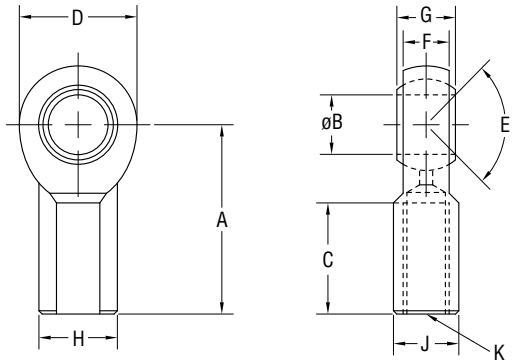
For Rod End with Splined Main Rod, see pg 32

Rod Clevis Dimensions



in (mm)	GSM20 - RC038	GSM30 - RC050	GSM40 - RC075
A	0.810 (20.6)	0.75 (19.1)	1.125 (28.58)
B	0.785 (19.9)	0.75 (19.1)	1.25 (31.75)
C	1.595 (40.5)	1.50 (38.1)	2.375 (60.3)
D	0.182 (4.6)	0.50 (12.7)	0.625 (15.88)
E	0.386 (9.8)	0.765 (19.43)	1.265 (32.13)
ØF	0.373 (9.5)	0.50 (12.7)	0.75 (19.1)
ØG	0.951 (24.2)	1.00 (25.4)	1.50 (38.1)
H	NA	1.00 (25.4)	1.25 (31.75)
ØJ	NA	1.00 (25.4)	1.25 (31.75)
K	3/8-24	7/16-20	3/4-16

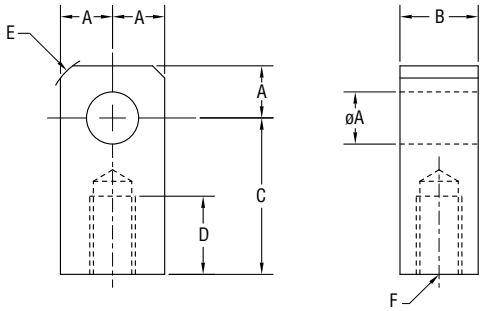
Spherical Rod Eye Dimensions



in (mm)	GSM20 - SRM038	GSM30 - SRM044	GSM40 - SRM075
A	1.625 (41.3)	1.81 (46.0)	2.88 (73.2)
ØB	0.375 (9.525)	0.438 (11.13)	0.75 (19.1)
C	0.906 (23.0)	1.06 (26.9)	1.72 (43.7)
D	1.0 (25.4)	1.13 (28.7)	1.75 (44.5)
E	6 deg	14 deg	14 deg
F	0.406 (10.3)	0.44 (11.1)	0.69 (17.5)
G	0.500 (12.7)	0.56 (14.2)	0.88 (22.3)
H	0.688 (17.4)	0.75 (19.1)	1.13 (28.7)
J	0.562 (14.3)	0.63 (16.0)	1.00 (25.4)
K	3/8-24	7/16-20	3/4-16

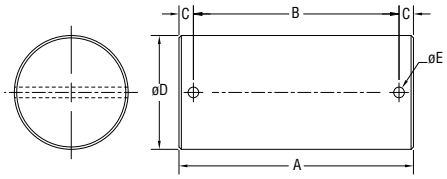
Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Rod Eye Dimensions



in (mm)	GSM20 - RE038	GSM30 - RE050	GSM40 - RE075
ØA	0.50 (12.7)	0.50 (12.7)	0.75 (19.1)
B	0.560 (14.2)	0.75 (19.1)	1.25 (31.8)
C	1.00 (25.4)	1.50 (38.1)	2.06 (52.3)
D	0.50 (12.7)	0.75 (19.1)	1.13 (28.7)
E	0.25 x 45°	0.63 (16.0)	0.88 (22.3)
F	3/8 - 24	7/16 - 20	3/4 - 16

Rod Clevis Pin Dimensions



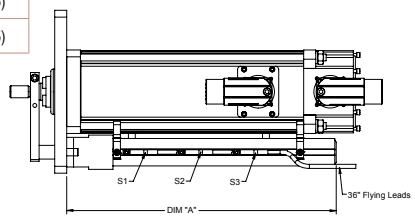
in (mm)	A	B	C	ØD	ØE
CP050[1]	2.28 (57.9)	1.94 (49.28)	0.17 (4.32)	0.50 -0.001/-0.002 (12.7 +0.00/-0.05)	0.106 (2.69)
CP075[2]	3.09 (78.5)	2.72 (69.1)	0.19 (4.82)	0.75 -0.001/-0.002 (19.1 +0.00/-0.05)	0.14 (3.56)

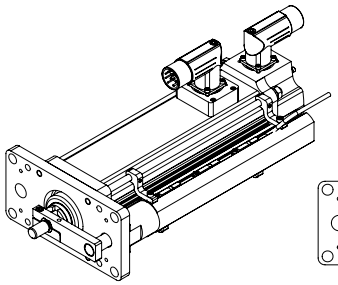
[1] Fits GSM30 rear clevis, RC050 and RE050
[2] Fits GSM30, 40 and RC075, RE075 and SRM075

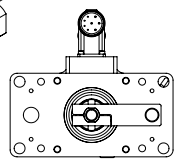
GSM20, GSM30 and GSM40 External Limit Switch Extension Options

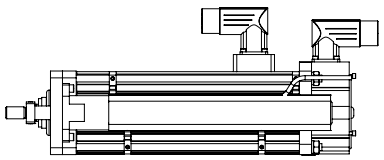
Dim A	3 inch (76 mm) stroke in (mm)	6 inch (152 mm) stroke in (mm)	8 inch (203 mm) stroke in (mm)	10 inch (254 mm) stroke in (mm)	12 inch (305 mm) stroke in (mm)	18 inch (457 mm) stroke in (mm)
GSM20	5.515 (140.1)	8.515 (216.3)	NA	12.5 (317.5)	14.515 (368.7)	NA
GSM30	6.932 (176.1)	9.832 (249.7)	NA	13.832 (351.3)	15.832 (402.1)	21.832 (554.5)
GSM40	NA	9.832 (249.7)	11.83 (300.5)	13.832 (351.3)	15.832 (402.1)	21.832 (554.5)

** Dimensions for Anti rotate option can be seen on page 30.*









The external limit switch option (requires anti-rotate option) provides the user with 1, 2, or 3 externally mounted adjustable switches for use as the end-of-travel limit switches or home position sensors.

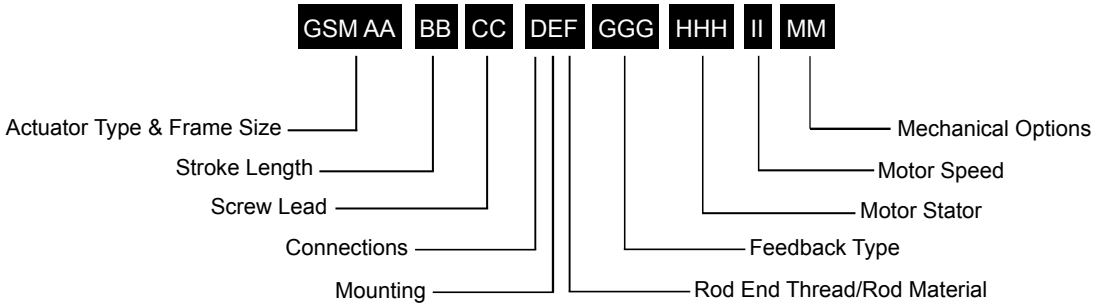
The number of switches desired is selected by ordering the L1, L2, or L3 option, in which 1, 2, or 3 switches will be provided, respectively.

The switches are 9-30 VDC powered, PNP output, with either normally open or normally closed logic operation depending on the switch configuration ordered. Switches are supplied with 1 meter of 3-wire embedded cable. Below is a chart that shows which logic operation will be provided for each switch, based on the option that is ordered.

Option	SW1	SW2	SW3
L1	Not Supplied	Normally Open	Not Supplied
L2	Normally Closed	Not Supplied	Normally Closed
L3	Normally Closed	Normally Open	Normally Closed

Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch	43404	BIM-UNT-RP6X
Normally Open Switch	43403	BIM-UNT-AP6X

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.



AA = GSM Actuator Size (nominal)
20 = 2 in (60 mm) frame
30 = 3 in (80 mm) frame
40 = 4 in (100 mm) frame

BB = Stroke Length
03 = 3 in (76 mm) GSM20 and GSM30
04 = 4 in (102 mm) GSM40
06 = 6 in (152 mm) all models; 5.9 in (150 mm) GSM30
08 = 8 in (203 mm) GSM40
10 = 10 in (254 mm) GSM20, GSM30 and GSM40
12 = 12 in (305 mm) GSM20, GSM30 and GSM40
18 = 18 in (457 mm) GSM30 and GSM40

CC = Lead
01 = 0.1 in (2.54 mm) (all models)
02 = 0.2 in (5.08 mm) (all models)
04 = 0.4 in (10.16 mm) (GSM20)
05 = 0.5 in (12.7 mm) (GSM30 and GSM40)
08 = 0.75 in (19.05 mm) (GSM40) [3]

D = Connections
I = Exlar standard M23 style
M = Manufacturer's connector [1]
J = Embedded leads with "I" plug, 3 ft. standard

E = Mounting
C = Rear clevis
F = Front flange
R = Rear flange
D = Double side mount [14]
T = Side trunnion
E = Extended tie rods
K = Metric double side mount [14]
Q = Metric side trunnion
M = Metric extended tie rods
G = Metric rear clevis

F = Rod End Thread / Rod Material
M = Male, US standard thread
A = Male, metric thread
F = Female, US standard thread
B = Female, metric thread
W = Male, US standard thread SS [12]
R = Male metric thread SS [12]
V = Female, US standard thread SS [12]
L = Female, metric thread SS [12]

GGG = Feedback Type
See page 207 for detailed information.

HHH = Motor Stator [2] – All 8 Pole [10]

118 = 1 stack	115 Vrms	158 = 1 stack	400 Vrms
218 = 2 stack		258 = 2 stack	
138 = 1 stack	230 Vrms	168 = 1 stack	460 Vrms
238 = 2 stack		268 = 2 stack	

II = Motor Speed
30 = 3000 rpm, GSM30, GSM40
50 = 5000 rpm, GSM20

MM = Mechanical Options [15]
AR = External anti-rotate [9]
HW = Manual drive, Handwheel with interlock switch [7, 11]
PB = Protective bellows [8]
SR = Splined main rod
RB = Rear brake
PF = Preloaded follower [4, 13]
L1/L2/L3 = External limit switch [6]
P5 = IP65S sealing option [5]

NOTES:
1. Available as described in Feedback Types.
2. Stator voltage and pole options allow for catalog rated performance at varying amplifier bus voltages and pole configuration requirements.
3. 0.75 lead not available over 12 inch stroke
4. The dynamic load rating of zero backlash, preloaded screws is 63% of the dynamic load rating of the standard non-preloaded screws. The calculated travel life of a preloaded screw will be 25% of the calculated travel life of the same size and lead of a non-preloaded screw. Preloaded follower is not available with absolute linear (LT) internal feedback option.
5. Not available with splined main rod option.
6. Requires AR option
7. Not available on GSM20.
8. Not available with extended tie rod mounting option.
9. A second anti-rotate arm is used on GSM 20, 30 & 40 for 10 inch and longer stroke.
10. See page 48 for optimized stators.
11. N/A with holding brake unless application details are discussed with your local ales representative.
12. Consult with your local sales representative when ordering splined stainless steel main rod.
13. Preloaded follower includes angular contact bearings.
14. Anti-rotate with D or K mounting N/A on 10 inch or longer stroke.
15. For extended temperature operation consult factory for model number.

For cables and accessories, see page 202.

For options or specials not listed above or for extended temperature operation, please contact Exlar

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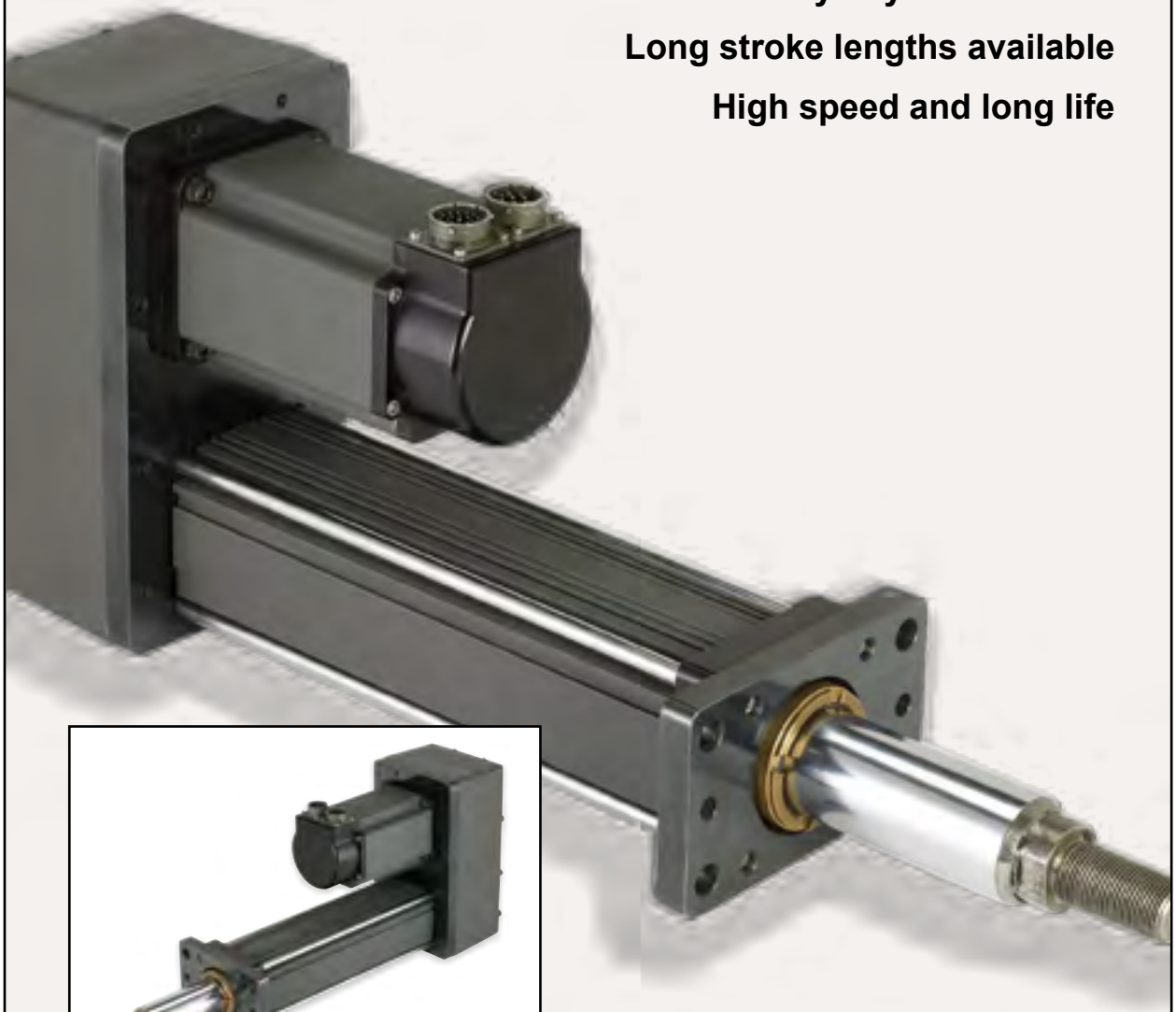
FT SERIES

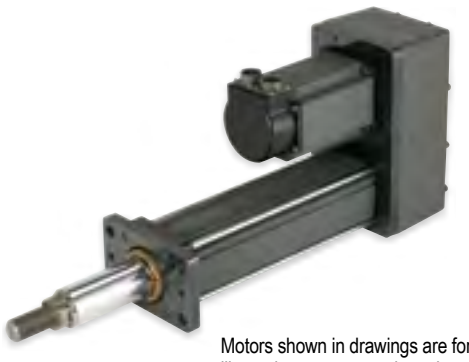
HIGH FORCE ROLLER SCREW ACTUATOR

Mount virtually any servo motor

Long stroke lengths available

High speed and long life





Motors shown in drawings are for illustrative purposes only and are not included with FT Actuators.

FT Series

Linear Actuators

High Performance

As with all Exlar roller screw products, the FT Series actuators deliver heavy load capacity, high speed capabilities, and exceptionally long life when compared to other linear actuator technologies.

Other comparably-sized screw actuator products on the market, specifically ball screw and acme screw actuators, have relatively low load capacities, short working lives and limited speed capabilities. At equivalent sizes, under moderate to heavy loads, it is reasonable to project that FT units will deliver up to 15 times the working life of those other methods. For OEM designers, this often means much more power and durability can be achieved from a much smaller footprint when Exlar FT units are used.

Contamination Protection

The FT Series design has all the contamination-isolation advantages of hydraulic cylinders without the limited load, life, and speed of designs built around ball or acme screws. The bearing and roller screw components in the Exlar FT Series force tubes are mounted within the sealed housing. This prevents abrasive particles and other contaminants from entering the actuator's critical mechanisms, and assures trouble-free operation even in the most severe environments.

FT Series actuators are provided with standard grease lubrication. Custom provisions can be made for oil filled lubrication.

Feature	Standard	Optional
Long Strokes	6 inch, 12 inch, 18 inch, 24 inch, 36 inch, and 48 inch	Intermediate Lengths up to 96 inch
Pre-Loaded Follower	No	Yes
External Limit Switches	No	One, Two or Three Adjustable Switches
Multiple Actuator Mountings	Side Mount, Side Lug, Extended Tie Rods, Rear Clevis, Front Flange, Side Trunnion, Rear Flange, Front/Rear Flange	Specials Available
Multiple Motor Mounting Configurations	Inline Direct Drive, Parallel 1:1 Drive, Parallel, 2:1 Reduction	Specials Available

Engineered Compatibility

Exlar has removed much of the end-user-engineering burden by designing the FT series to be compatible with a wide variety of standard motors. Motor mounting, actuator mounting, and gearing configurations are available to meet nearly any application's requirements.

Exlar FT Series force tube actuators use a planetary roller screw mounted inside a telescoping tube mechanism. The follower is attached to the moveable force tube, which then extends and retracts as the screw rotates. An external motor (supplied by Exlar or the customer) provides the rotational force.

Technical Characteristics	
Frame Sizes - in (mm)	3.5 (90), 4.8 (120), 6.0 (150), 8.0 (200)
Screw Leads - in (mm)	0.2 (5), 0.25 (6), 0.4 (10), 0.5 (12), 0.8 (20), 1.2 (30)
Standard Stroke Lengths in (mm)	6 (150)*, 12 (300), 18 (450), 24 (600), 36 (900), 48 (1200)
Force Range	up to 40,000 lbf (178 kN)
Maximum Speed	up to 60 in/sec (1524 mm/s)

*Not on FT60 or FT80

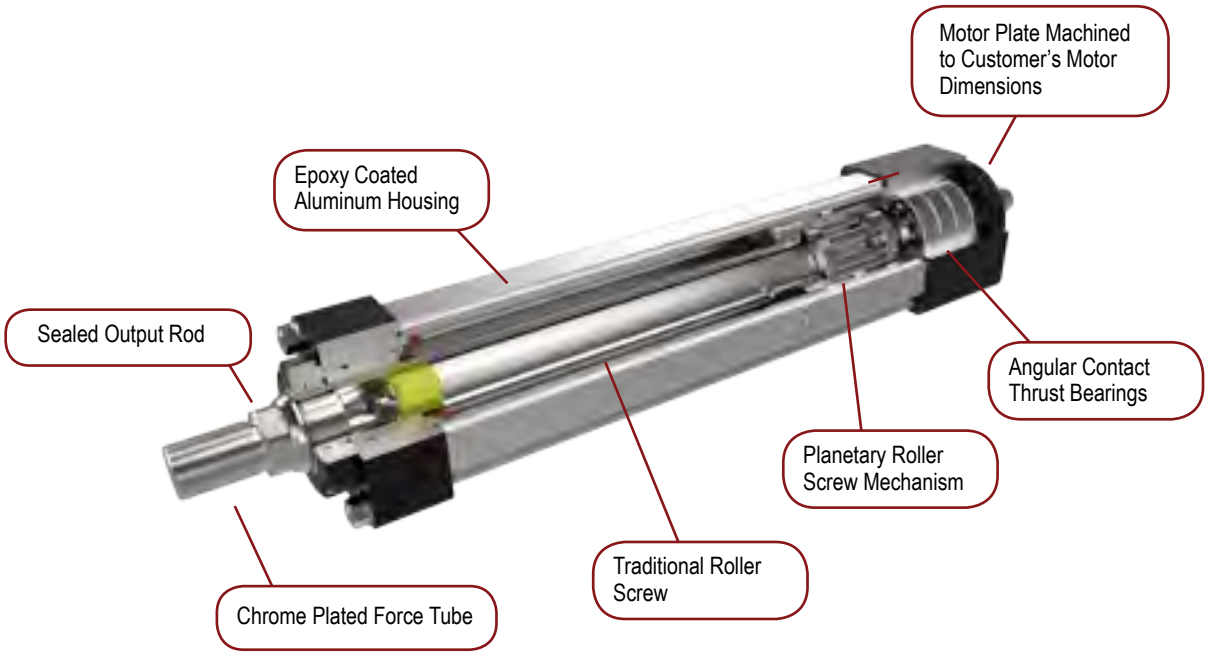
Operating Conditions and Usage		
Accuracy:		
Screw Lead Accuracy	in/ft (mm/300 mm)	0.001 (0.025)
Screw Lead Variation	in (mm)	0.0012 (0.030)
Actuator Backlash*	in (mm)	0.002 (0.06)
Friction Torque Values	lbf-in (Nm)	FT35: 7.0 (0.79) FT45: 11.00 (1.24) FT60: 14.0 (1.58) FT80: 35.0 (3.95)
Efficiency:		
Motor Inline	%	80
Motor Parallel	%	80
Ambient Conditions:		
Standard Ambient Temperature	°C	0 to 65
Extended Ambient Temperature***	°C	-30 to 65
Storage Temperature	°C	-40 to 85
IP Rating**		IP65

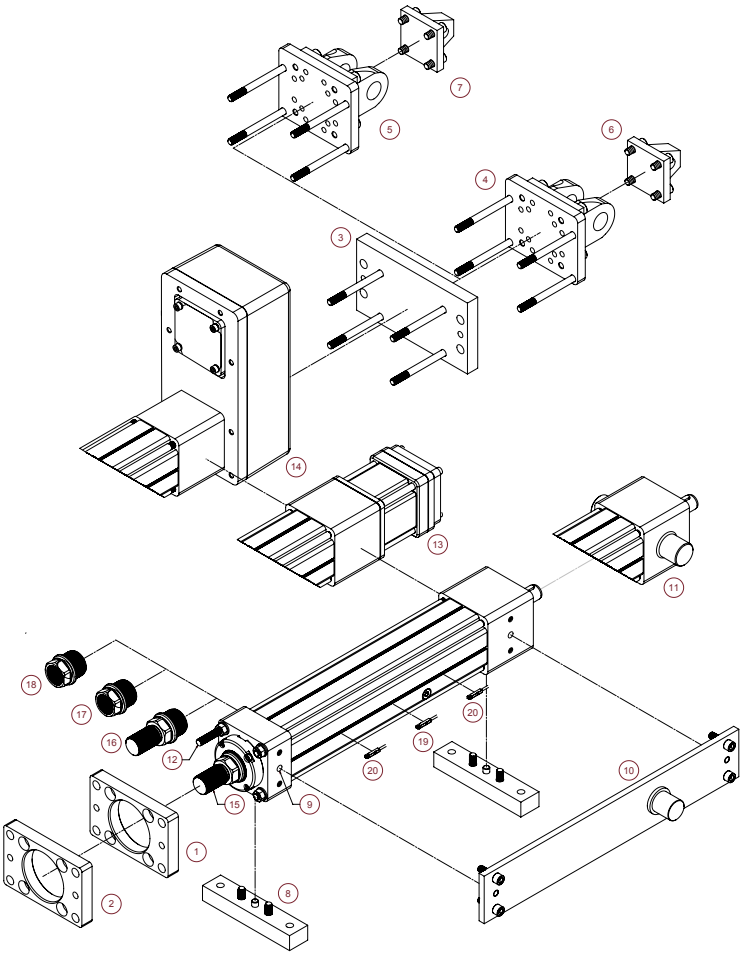
* System backlash will be different with various types of motor mounting arrangements and couplings. Please discuss your particular configuration with your local sales representative.

** For IP65S sealing of unit with motor mounted, please contact your local sales representative.

*** Consult Exlar for extended temperature operation.

Product Features





1 - Front/rear flange, English and front flange, English
2 - Front flange, metric
3 - Front/rear flange, English* and rear flange, English
4 - Rear clevis, English
5 - Rear clevis, metric
6 - Rear eye English
7- Rear eye, metric
9 - Side mount*, double side mount, metric side mount*, and metric double side mount
10 - Side trunnion and metric side trunnion
11 - Rear trunnion and metric rear trunnion
12 - Extended tie rods and metric extended tie rods
13 - Inline direct drive
14 - Parallel, 1:1 belt reduction
Parallel, 2:1 belt reduction
15 - Male, US standard thread and male, US standard thread SS
16 - Male, metric thread and male metric thread SS
17 - Female, US standard thread and female, US standard thread SS
18 - Female, metric thread and female, metric thread SS
19 - External limit switch - N.O., PNP or NPN
20 - External limit switch - N.C., PNP or NPN

*Consult Factory

Industries and Applications

Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement

Automotive
- Lift station
- Automated assembly
- Riveting / fastening / joining
- Pressing

Sawmill/Forestry
- Saw positioning
- Fence positioning

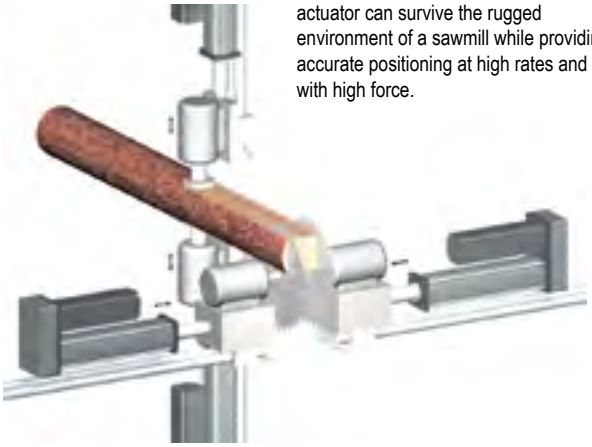
Process Control
- Conveyor diverters / gates
- Precision valve control
- Tension control

Machining
- Automated flexible fixturing
- Machine tool
- Parts clamping
- Precision grinders

Entertainment / Simulation
- Action simulators
- Ride automation

Material Handling
- Stamping
- Indexing stages
- Product sorting
- Material cutting
- Web guidance
- Wire winding
- Pressing
- Tube bending

Test
- Test stands



The robust design of the FT series actuator can survive the rugged environment of a sawmill while providing accurate positioning at high rates and with high force.

With their high thrust capability, compact size and smooth controlled motion, FT Series actuators are an ideal replacement for hydraulics or pneumatics on injection mold toggles. Control improvements from an electromechanical servo system offer less abuse of valuable molds and more consistent performance.

Motors shown in drawings are for illustrative purposes only and are not included with FT Actuators.

Mechanical Specifications

FT35

		High Capacity			Standard Capacity		
		05	10	20	05	10	20
Screw Lead	in	0.197	0.394	0.787	0.197	0.394	0.787
	mm	5	10	20	5	10	20
Maximum Force[2]	lbf	5,000	5,000	5,000	5,000	5,000	5,000
	N	22.2	22.2	22.2	22.2	22.2	22.2
Life at Maximum Force	in x 10^6	15.4	24.6	56.7	8.88	14.15	32.05
	km	392	626	1,440	225.6	359.4	814.2
C_a (Dynamic Load Rating)	lbf	21,400	19,850	20,800	17,800	16,500	17,200
	N	95.2	88.3	92.5	79.2	73.4	76.5
Maximum Input Torque	lbf-in	196	392	783	196	392	783
	Nm	22.1	44.3	88.5	22.1	44.3	88.5
Max Rated RPM @ Input Shaft	RPM	4,500	4,500	4,500	4,500	4,500	4,500
Maximum Linear Speed @ Maximum Rated RPM	in/sec	14.7	29.5	59.3	14.7	29.5	59.3
	mm/sec	373	750	1,500	373	750	1,500

[1] FT35 actuators with high capacity screw option are 20 mm longer. See dimensions page 128.

[2] Maximum allowable actuator-generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight	Stroke Length	6 Inch	12 Inch	18 Inch	24 Inch	36 Inch	48 Inch
	lb	30	35	40	45	55	65
	kg	14	16	18	21	25	30

Adder for Inline (excluding motor)	Adder for Parallel Drive (excluding motor)	Adder for Front Flange	Adder for Rear Flange	Adder for Rear Clevis	Adder for Rear Eye	Adder for Front/ Rear Angle Mounts	Adder for Two Trunnions	Adder for Two Foot Mounts
8 (3.6)	16 (7.3)	5.4 (2.5)	7.4 (3.4)	3.0 (1.4)	NA	NA	19.5 (8.9)	3.3 (1.5)

FT35 Reflective Inertias	5 mm Lead	10 mm Lead	20 mm Lead	
NMT Unit - J (0)	0.0004087	0.0004121	0.0004259	kg-m² (at input shaft)
NMT Unit - J (Stroke)	0.0000159	0.0000162	0.0000171	kg-m²/inch of stroke
Inline w/ Coupler - J (0)	0.0005127	0.0005161	0.0005299	
Inline w/ Coupler - J (Stroke)	0.0000159	0.0000162	0.0000171	
Parallel 1:1 - J (0)	0.0011042	0.0011855	0.0014480	kg-m² (at motor shaft)
Parallel 1:1 - J (Stroke)	0.0000159	0.0000162	0.0000171	kg-m²/inch of stroke
Parallel 2:1 - J (0)	0.0014029	0.0014038	0.0015345	
Parallel 2:1 - J (Stroke)	0.0000040	0.0000040	0.0000043	

*Pulleys for parallel mount match actuator max performance ratings

Standard Inline Coupling Inertia	
	Inertia
FT35	0.000104 kg-m² (0.000920 lbf-in s²)

Pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

Intermediate and custom stroke lengths are available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection. Please contact your local sales representative.

*See definitions on page 124

FT45

		High Capacity		Standard Capacity	
		05	10	05	10
Screw Lead	in	0.197	0.394	0.197	0.394
	mm	5	10	5	10
Maximum Force[2]	lbf	10,000	10,000	10,000	10,000
	N	44.5	44.5	44.5	44.5
Life at Maximum Force	in x 10^6	9.81	19.14	5.67	11.06
	km	249.2	486.3	144.0	280.9
C_a (Dynamic Load Rating)	lbf	36,800	36,500	30,650	30,400
	N	163.7	162.4	136.3	135.2
Maximum Input Torque	lbf-in	392	783	392	783
	Nm	44.1	88.2	44.1	88.2
Max Rated RPM @ Input Shaft	RPM	3,500	3,500	3,500	3,500
Maximum Linear Speed @ Maximum Rated RPM	in/sec	11.5	23.0	11.5	23.0
	mm/sec	292	583	292	583

Weights kg (lbs)

Base Actuator Weight	Stroke Length	6 Inch	12 Inch	18 Inch	24 Inch	36 Inch	48 Inch
	lb	57	68	79	90	112	135
	kg	26	31	36	41	51	61

Adder for Inline (excluding motor)	Adder for Parallel Drive (excluding motor)	Adder for Front Flange	Adder for Rear Flange	Adder for Rear Clevis	Adder for Rear Eye	Adder for Front/ Rear Angle Mounts	Adder for Two Trunnions	Adder for Two Foot Mounts
7.1 (3.2)	42.5 (19.3)	6.1 (2.8)	17.4 (7.9)	18.9 (8.6)	19.8 (9)	NA	17.2 (7.8)	10.4 (4.7)

FT45 Reflective Inertias	5 mm Lead	10 mm Lead	
NMT Unit - J (0) NMT Unit - J (Stroke)	0.002463 0.000045	0.002474 0.000046	kg-m² (at input shaft) kg-m²/inch of stroke
Inline w/ Coupler - J (0) Inline w/ Coupler - J (Stroke)	0.002571 0.000045	0.002581 0.000046	kg-m² (at motor shaft) kg-m²/inch of stroke
Parallel 1:1 - J (0) Parallel 1:1 - J (Stroke)	0.006911 0.000045	0.006921 0.000046	
Parallel 2:1 - J (0) Parallel 2:1 - J (Stroke)	0.003466 0.000011	0.003469 0.000011	

*Pulleys for parallel mount match actuator max performance ratings

Standard Inline Coupling Inertia	
	Inertia
FT45	0.00010743 kg-m² (0.000951 lbf-in s²)

Pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

*See definitions on page 124

FT60

		High Capacity			Standard Capacity		
		06	12	30	06	12	30
Screw Lead	in	0.236	0.472	1.181	0.236	0.472	1.181
	mm	6	12	30	6	12	30
Maximum Force[2]	lbf	20,000	20,000	20,000	20,000	20,000	20,000
	N	89.0	89.0	89.0	89.0	89.0	89.0
Life at Maximum Force	in x 10^6	5.7	7.3	38.6	4.1	5.2	10.7
	km	145.8	184.7	981.1	104.8	133.1	271.9
C_a (Dynamic Load Rating)	lbf	57,933	49,750	63,958	51,900	44,600	41,700
	N	257.7	221.3	284.5	230.9	198.4	185.5
Maximum Input Torque	lbf-in	940	1880	4699	940	1880	4699
	Nm	106	212	531	106	212	531
Max Rated RPM @ Input Shaft	RPM	2,000	2,000	2,000	2,000	2,000	2,000
Maximum Linear Speed @ Maximum Rated RPM	in/sec	7.9	15.8	39.0	7.9	15.8	39.0
	mm/sec	201	401	1000	201	401	1000

Intermediate and custom stroke lengths are also available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection.

* Maximum allowable actuator-generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight	Stroke Length	12 inch	24 inch	36 Inch	48 Inch
	lb	100	130	160	190
	kg	45	59	72	86

Adder for Inline (excluding motor)	Adder for Parallel Drive (excluding motor)	Adder for Front Flange	Adder for Rear Flange	Adder for Rear Clevis	Adder for Rear Eye	Adder for Front/ Rear Angle Mounts	Adder for Two Trunnions	Adder for Two Foot Mounts
20.4 (9.3)	39.1 (17.7)	13.4 (6.1)	15.9 (7.2)	11.1 (5)	NA	NA	44.3 (20.1)	10.4 (4.7)

FT60 Reflective Inertias	6 mm Lead	12 mm Lead	30 mm Lead	
NMT Unit - J (0) NMT Unit - J (Stroke)	0.0078464 0.0002539	0.0078709 0.0002547	0.0080424 0.0002600	kg-m² (at input shaft) kg-m²/inch of stroke
Inline w/ Coupler - J (0) Inline w/ Coupler - J (Stroke)	0.0081764 0.0002539	0.0082009 0.0002547	0.0083724 0.0002600	
Parallel 1:1 - J (0) Parallel 1:1 - J (Stroke)	0.0129357 0.0002539	0.0146113 0.0002547	0.0312682 0.0002600	kg-m² (at motor shaft) kg-m²/inch of stroke
Parallel 2:1 - J (0) Parallel 2:1 - J (Stroke)	0.0049158 0.0000635	0.0057202 0.0000637	0.0214777 0.0000650	

*Pulleys for parallel mount match actuator max performance ratings

Standard Inline Coupling Inertia	
	Inertia
FT60	0.000330 kg-m² (0.002921 lbf-in s²)

Pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

*See definitions on page 124

FT80

		High Capacity			Standard Capacity		
		06	12	30	06	12	30
Screw Lead	in	0.236	0.472	1.181	0.236	0.472	1.181
	mm	6	12	30	6	12	30
Maximum Force[2]	lbf	40,000	40,000	40,000	40,000	40,000	40,000
	N	177.9	177.9	177.9	177.9	177.9	177.9
Life at Maximum Force	in x 10^6	3.1	4.4	16.3	1.94	2.55	5.00
	km	78.7	111.4	414.3	49.3	64.9	127
C_a (Dynamic Load Rating)	lbf	94,330	84,079	95,971	80,700	70,200	64,700
	N	419.6	374	426.9	359	312.2	287.8
Maximum Input Torque	lbf-in	1,880	3,760	9,399	1,880	3,760	9,399
	Nm	212	425	1,062	212	425	1,062
Max Rated RPM @ Input Shaft	RPM	1,750	1,750	1,750	1,750	1,750	1,750
Maximum Linear Speed @ Maximum Rated RPM	in/sec	6.9	13.8	34.4	6.9	13.8	34.4
	mm/sec	175	351	875	175	351	875

Intermediate and custom stroke lengths are also available. Intermediate leads may also be available. Belt and pulley inertia varies with ratio and motor selection. Please contact your local sales representative.

* Maximum allowable actuator-generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight	Stroke Length	12 Inch	24 Inch	36 Inch	48 Inch
	lb	190	265	340	415
	kg	86	120	153	187

Adder for Inline (excluding motor)	Adder for Parallel Drive (excluding motor)	Adder for Front Flange	Adder for Rear Flange	Adder for Rear Clevis	Adder for Rear Eye	Adder for Front/ Rear Angle Mounts	Adder for Two Trunnions	Adder for Two Foot Mounts
54.9 (24.9)	79.1 (35.9)	28.5 (17.5)	NA	NA	NA	NA	NA	34.8 (15.8)

FT80 Reflective Inertias	6 mm Lead	12 mm Lead	30 mm Lead	
NMT Unit - J (0) NMT Unit - J (Stroke)	0.0302504 0.0008022	0.0303275 0.0008035	0.0308673 0.0008124	kg-m² (at input shaft) kg-m²/inch of stroke
Inline w/ Coupler - J (0) Inline w/ Coupler - J (Stroke)	0.0314604 0.0008022	0.0315375 0.0008035	0.0320773 0.0008124	kg-m² (at motor shaft) kg-m²/inch of stroke
Parallel 1:1 - J (0) Parallel 1:1 - J (Stroke)	0.0721056 0.0008022	0.0535533 0.0008035	0.1342578 0.0008124	
Parallel 2:1 - J (0) Parallel 2:1 - J (Stroke)	0.0198765 0.0002006	0.0270490 0.0002009	0.0753395 0.0002031	

*Pulleys for parallel mount match actuator max performance ratings

Standard Inline Coupling Inertia	
	Inertia
FT80	0.0001210 kg-m² (0.010709 lbf-in s²)

Pulley inertias reflected at motor including typical pulleys, belt and standard bushings. Because of differences in belt and pulley selection due to particular motor choices, please contact your local sales representative if these values are critical to your application.

*See definitions on page 124

DEFINITIONS:

Maximum Force: Calculated Cubic Mean Load for the application should not exceed this value. (Values are derived from the design capacity of the FT Series actuator and should not be exceeded or relied upon for continuous operation.)

Life at Maximum Force: Estimated life that can be expected from the actuator when running at Maximum Force for intermittent periods of time. (Theoretical calculation based on the Dynamic Load Rating of the actuator and using the Maximum Force rating as the Cubic Mean Load.)

C_a (Dynamic Load Rating): A design constant used when calculating the estimated travel life of the roller screw.

Maximum Input Torque: The torque required at the screw to produce the Maximum Force rating. Exceeding this value can cause permanent damage to the actuator.

Maximum Rated RPM: The maximum allowable rotational screw speed determined by either screw length limitations or the rotational speed limit of the roller screw nut.

Maximum Linear Speed: The linear speed achieved by the actuator when Maximum Rated RPM is applied to the roller screw input shaft.

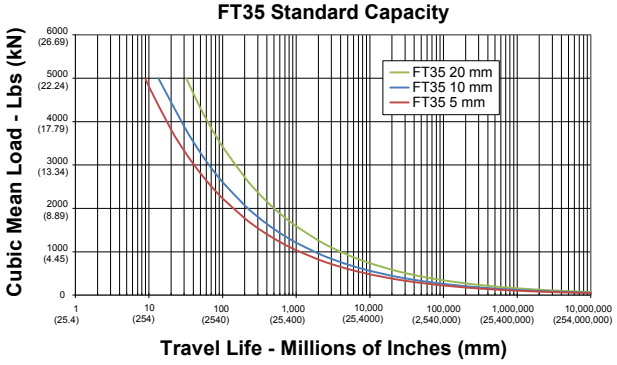
FT Series Accessories

Limit Switches (if required in addition to L1, L2, L3 option in actuator model)			
FT35, FT60, FT80			
Option	**Quantity**	**Part Number**	**Description**
L1	1	14453	Normally Closed PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L2	2	14453	Normally Closed PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L3	3	14453	Normally Closed PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L4			NA
L5			NA
L6			NA
FT45			
L1	1	43403	Normally Open PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L2	2	43404	Normally Closed PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L3	1 2	43403 43404	Normally Open PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable) Normally Closed PNP Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L4	1	67634	Normally Open NPN Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L5	2	67635	Normally Closed NPN Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)
L6	1 2	67634 67635	Normally Open NPN Limit Switch (10-30 VDC, 1m. 3 wire embedded cable) Normally Closed NPN Limit Switch (10-30 VDC, 1m. 3 wire embedded cable)

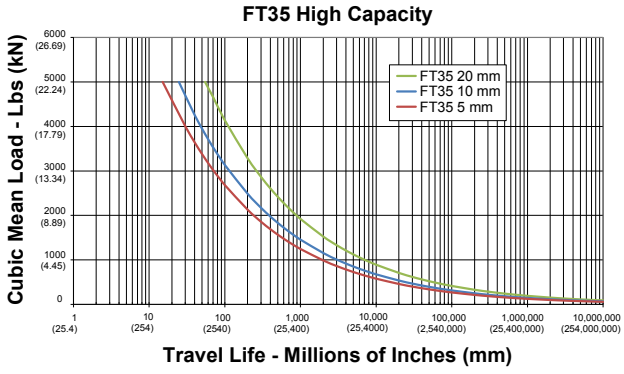
Consult your local sales representative to discuss maximum stroke length allowable with your final configuration.
Some accessories are available in stainless steel. Consult Exlar for availability and lead time.
*This option restricts max. load to 6.0 KN (1350 lbf) for K60, 8.9 KN (2000 lbf) for K75 and 9.3 KN (2100 lbf) for K90.

Estimated Service Life

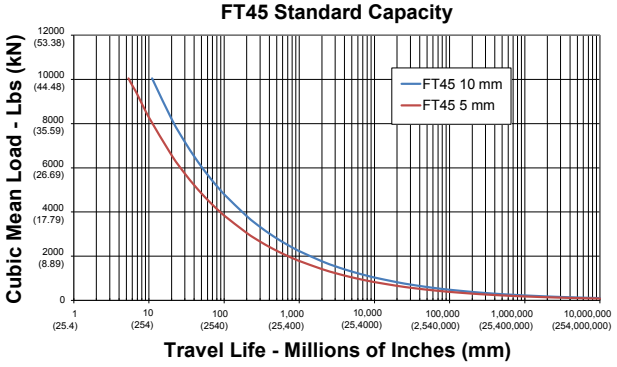
FT35 Standard Capacity



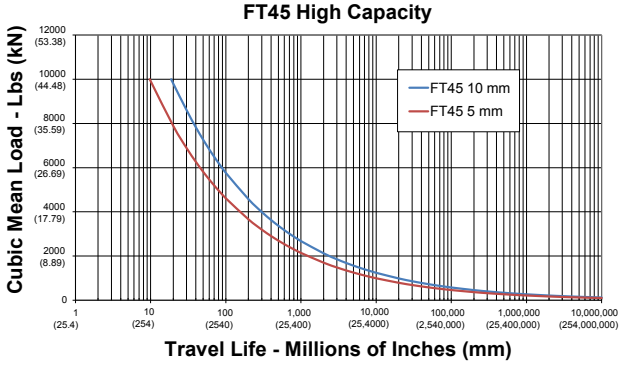
FT35 High Capacity



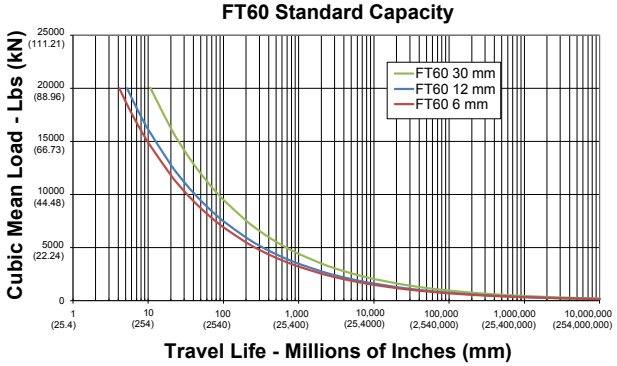
FT45 Standard Capacity



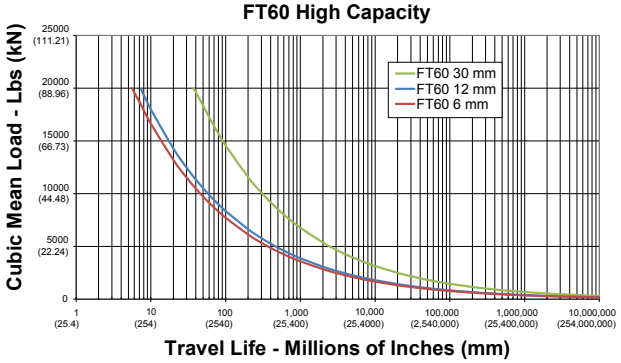
FT45 High Capacity



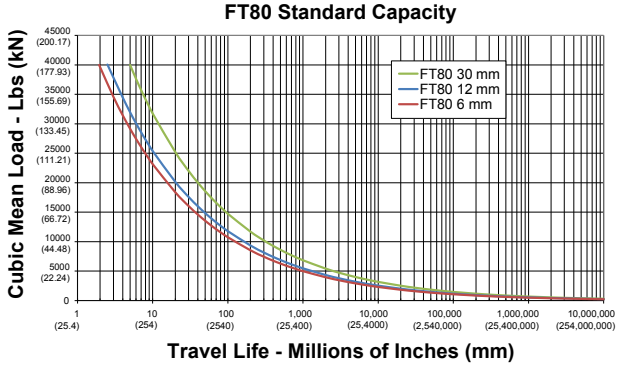
FT60 Standard Capacity



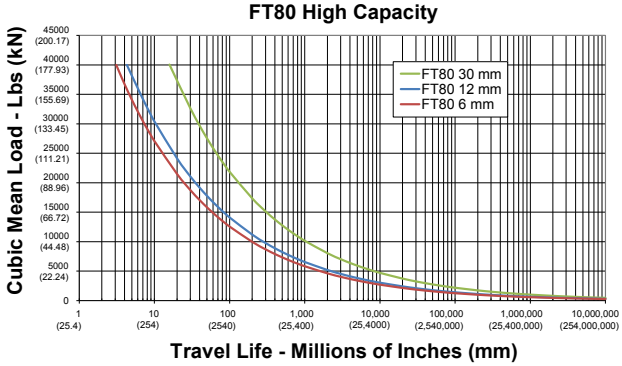
FT60 High Capacity



FT80 Standard Capacity



FT80 High Capacity



Service Life Estimate Assumptions:

- Sufficient quality and quantity of lubrication is maintained throughout service life (please refer to engineering reference on page 212 for lubrication interval estimates.)
- Bearing and screw temperature between 20° C and 40° C
- No mechanical hard stops (external or internal) or impact loads
- No external side loads
- Does not apply to short stroke, high frequency applications such as fatigue testing or short stroke, high force applications such as pressing. (For information on calculating estimating life for unique applications please refer to the engineering reference on page 212.

The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:
Travel life in millions of inches, where:

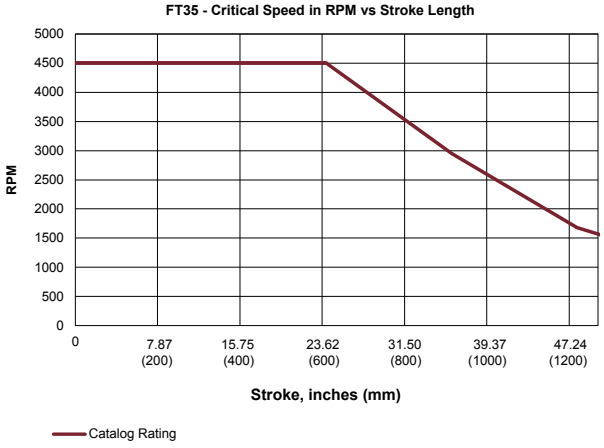
C_a = Dynamic load rating (lbf)
F_{cml} = Cubic mean applied load (lbf)
ℓ = Roller screw lead (inches)

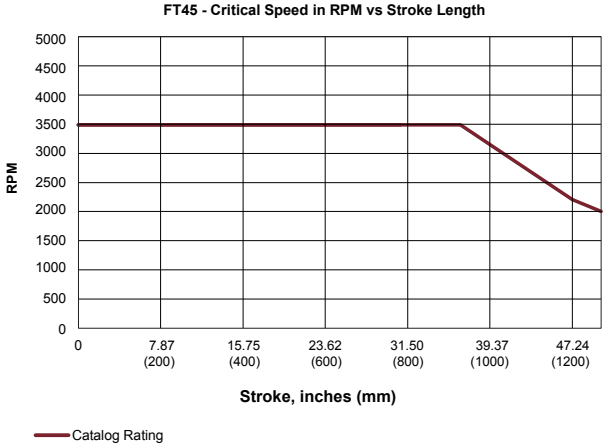
$$L_{10} = \left(\frac{C_a}{F_{cml}} \right)^3 x \ell$$

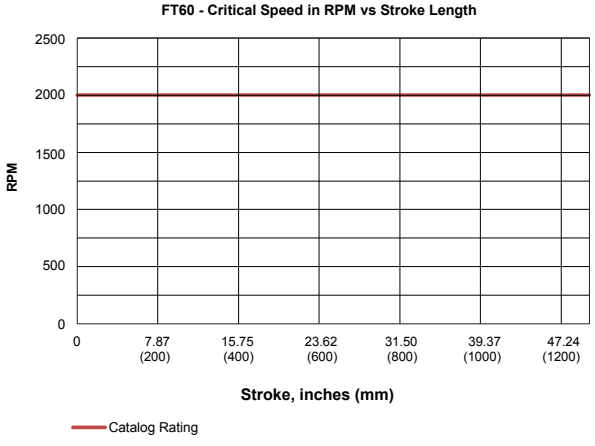
For additional details on calculating estimated service life, please refer to the Engineering Reference, page 212.

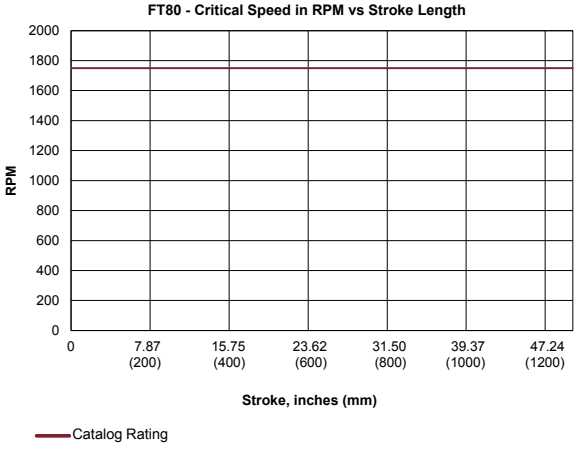
Data Curves

Critical Speed vs Stroke Length:



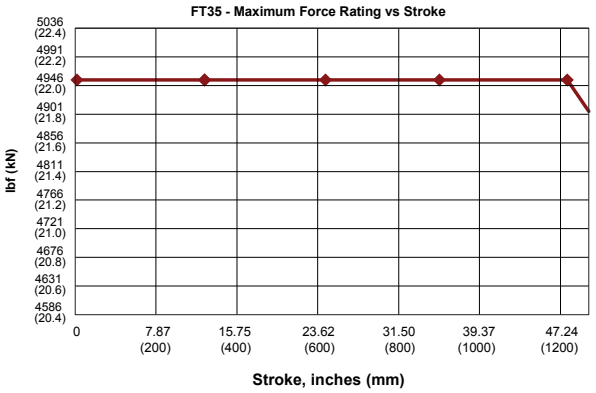


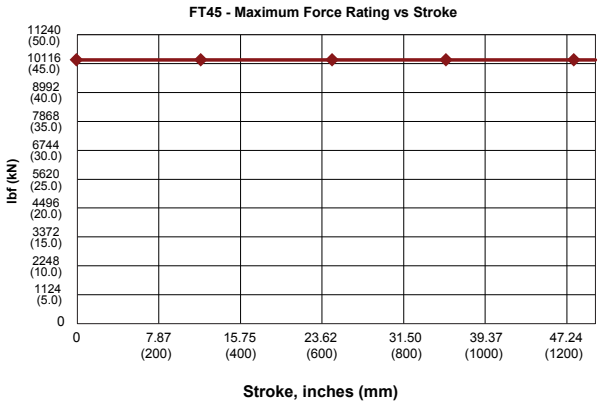


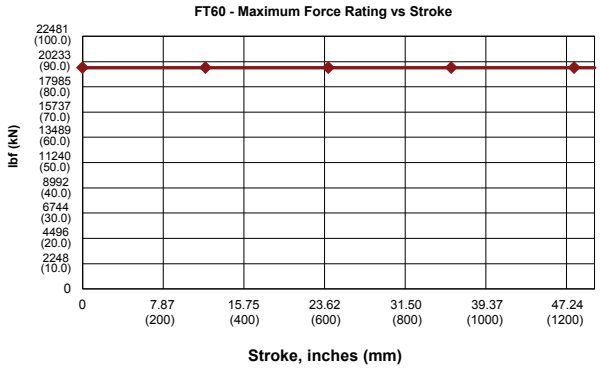


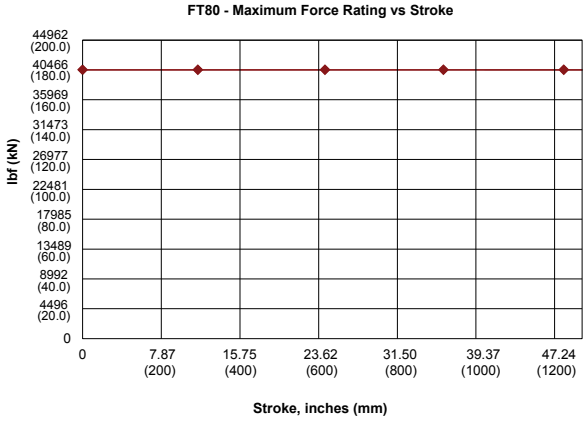
* With longer stroke length actuators, the rated speed of the actuator is determined by the critical speed

Maximum Force Rating





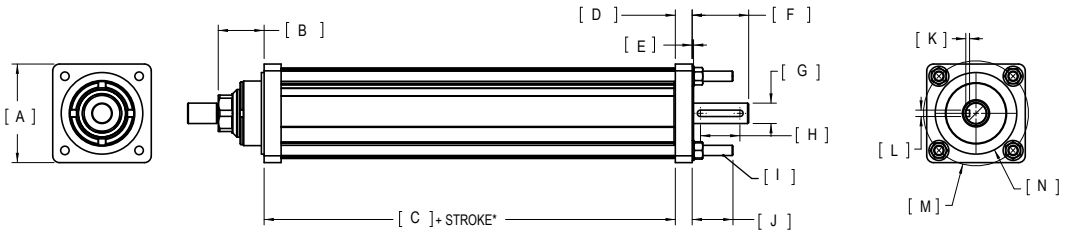




* With longer stroke length actuators, the rated speed of the actuator is determined by the critical speed

Dimensions

Base Actuator (FT35, FT60, FT80)

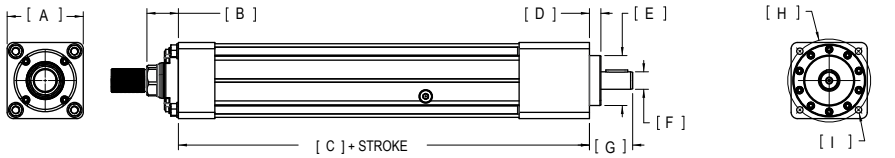


		FT35	FT60	FT80
A	in	□ 3.63	□ 6.38	□ 8.50
	mm	92.1	161.9	215.9
B	in	1.69	2.25	3.03
	mm	42.9	57.1	77.0
C	in	9.1*	15.3	19.8
	mm	232*	389	503
D	in	0.62	0.83	0.90
	mm	15.7	21.1	22.9
E	in	0.05	0.10	0.10
	mm	1.3	2.5	2.5
F	in	2.08	2.41	3.34
	mm	52.8	61.2	84.7
G	in	Ø 0.748 +0.00/-0.0005	Ø 1.378 +0.00/-0.0006	Ø 2.362 +0.00/-0.0005
	mm	19.0 +0.00/-0.013	35.0 +0.00/-0.016	60.0 +0.00/-0.013
H	in	1.45	1.60	1.48
	mm	36.8	40.5	37.5

		FT35	FT60	FT80
I	in	3/8- 16 UNC - 2A	9/16 - 12 UNC - 2A	3/4- 10 UNC - 2A
	mm	M8 x 1.25 6g	M14 x 2.0 6g	M20 x 2.5 6g
J	in	1.50	2.0	2.0
	mm	38.1	50.7	50.7
K	in	0.138 +0.004/-0.00	0.197 +0.008/-0.00	0.278 +0.005/-0.00
	mm	3.5 +0.1 0.0	5.0 +0.2 -0.0	7.0 +0.1 -0.0
L	in	0.236 -0.00/-0.002	0.3937 +0.0006/-0.0020	0.709 -0.001/-0.002
	mm	6.0 -0.012/-0.042	10.0 -0.015/-0.051	18.0 -0.018/-0.061
M	in	Ø 3.860 BC	Ø 6.79 BC	Ø 9.33 BC
	mm	98.0	172.4	237.0
N	in	Ø 3.00	Ø 5.00	Ø 6.75
	mm	76.2	127.0	171.5

*Add 20 mm if choosing high capacity option for the FT35

Base Actuator (FT45)

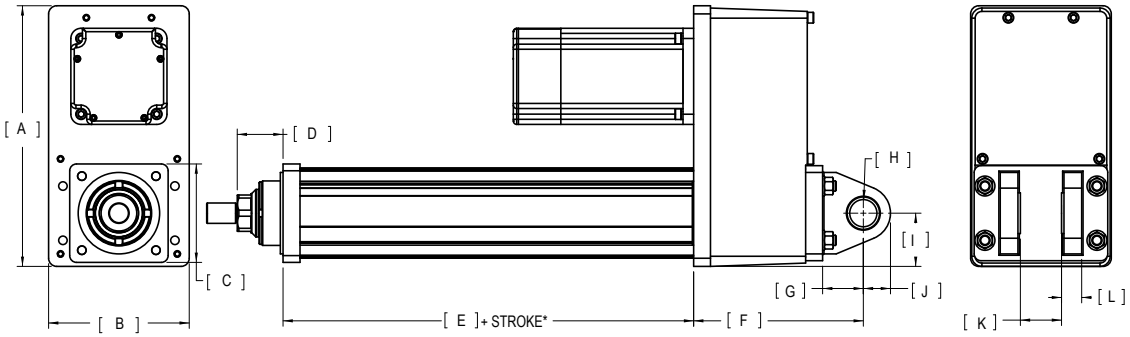


		FT45
A	in	□ 4.80
	mm	122.0
B	in	1.99
	mm	50.5
C	in	13.9
	mm	354
D	in	0.72
	mm	18.3
E	in	Ø 3.15
	mm	80.00

		FT45
F	in	Ø 1.102 +0.00/-0.0005
	mm	28.0 +0.00/-0.013
G	in	2.73
	mm	69.3
H	in	Ø 5.236 BC
	mm	133.0
I	in	4X M12X1.75 - 6H ↓ 1.0
	mm	26

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Clevis Mount



		FT35	FT45 (Option C)	FT45 (Option Q)	FT60
A	in	9.60	14.55	14.55	15.55
	mm	243.8	369.5	369.5	395.0
B	in	5.18	7.48	7.48	8.53
	mm	131.6	190.0	190.0	216.7
C	in	□ 3.63	□ 4.80	□ 4.80	□ 6.38
	mm	92.1	122.0	122.0	161.9
D	in	1.69	1.99	1.99	2.25
	mm	42.9	50.5	50.0	57.1
E	in	9.1*	13.9	13.9	15.3
	mm	232*	354	354	368
F	in	6.3	9.0	7.9	9.0
	mm	159	229	201	229
G	in	1.50	2.12	1.26	2.5
	mm	38.1	53.8	32.0	63.5
H	in	Ø 1.000** +0.002 / -0.001	Ø 1.378 ±0.001	Ø 0.787 H9	Ø 1.750*** +0.002 / -0.001
	mm	25.4 +0.05 / -0.03	35.0 ±0.03	20.00 H9	44.45 +0.05 / -0.03
I	in	2.0	3.1	3.1	3.43
	mm	50	78	78	87.1
J	in	1.00	1.4	0.6	2.13
	mm	25.4	35	15	54.0
K	in	1.52	2.03	1.18	1.25
	mm	38.5	51.6	30.0	31.8
L	in	0.74	1.0	0.6	2.51
	mm	19	25	15	63.9

Parallel motor mount shown.

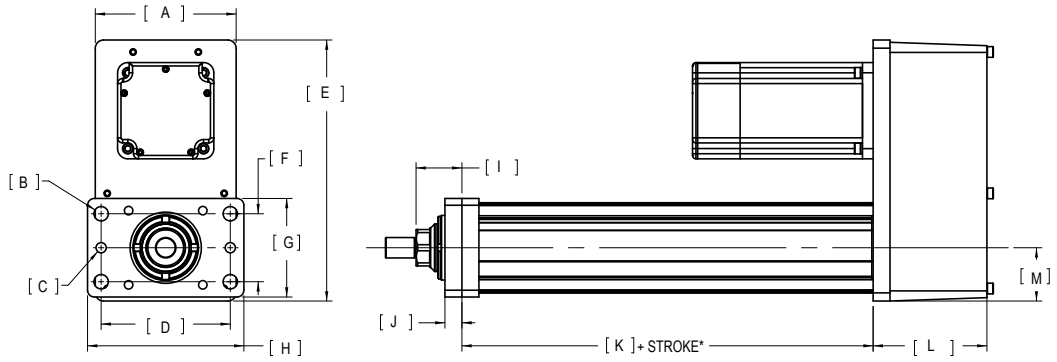
*Add 20 mm if choosing high capacity option for the FT35.

** If "G" metric clevis option, Ø 27 mm + 0.00 / - 0.06

*** If "G" metric clevis option, Ø 45 mm + 0.00 / - 0.08

Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Front Flange



		FT35	FT45	FT60	FT80
A	in	5.18	7.48	6.82	8.77
	mm	131.6	190.0	173.2	222.8
B	in	Ø 0.53	Ø 0.69	Ø 0.66	Ø 0.78
	mm	13.5	17.5	16.7	19.8
C	in	Ø 0.375 +0.001 / -0.000	Ø 0.500 +0.001 / -0.000	Ø 0.501 +0.001 / -0.000	Ø 0.625 +0.001 / -0.000
	mm	9.53 +0.03 / 0.00	12.70 +0.03 / 0.00	12.7 +0.03 / 0.00	15.9 +0.025 / 0.000
D	in	4.75	6.38	8.32	10.75
	mm	120.7	161.9	211.2	273.1
E	in	9.6	14.55	14.32	17.33
	mm	243.8	369.5	363.7	440.2
F	in	2.50	5.00	4.57	6.00
	mm	63.5	127.0	116.2	152.4
G	in	3.63	3.82	6.38	8.50
	mm	92.1	97.0	161.9	215.9
H	in	5.8	7.63	10.00	12.75
	mm	146	193.7	254.0	323.9
I	in	1.69	1.99	2.25	3.03
	mm	42.9	50.5	57.1	77.0
J	in	0.63	1.00	1.00	1.25
	mm	15.9	25.4	25.4	31.8
K	in	9.1*	13.9	15.3	19.8
	mm	232*	354	388	503
L	in	4.19	5.26	4.6	6.43
	mm	106.3	133.7	116	163.3
M	in	1.96	3.05	3.19	4.40
	mm	49.8	77.5	81.0	111.8

*Add 20 mm if choosing high capacity option for the FT35.

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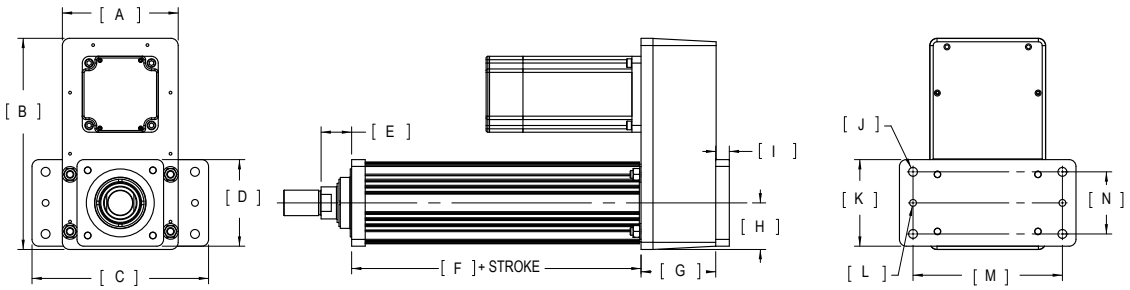
Rear Flange (FT35, FT60)

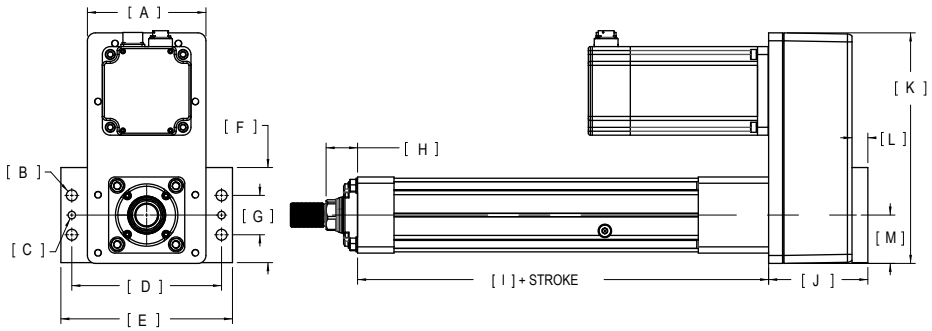


		FT35	FT60
A	in	5.18	8.53
	mm	131.6	216.7
B	in	9.60	15.55
	mm	243.8	395.0
C	in	9.00	13.00
	mm	228.6	330.2
D	in	□ 3.63	□ 6.38
	mm	92.1	161.9
E	in	1.69	2.25
	mm	42.9	57.1
F	in	9.1*	15.3
	mm	232*	388
G	in	4.13	5.50
	mm	104.8	139.7

*Add 20 mm if choosing high capacity option for the FT35

		FT35	FT60
H	in	1.96	3.43
	mm	49.8	87.1
I	in	0.63	1.00
	mm	15.9	25.4
J	in	Ø 0.53	Ø 0.66
	mm	13.5	16.7
K	in	3.5	6.38
	mm	88.9	161.9
L	in	Ø 0.375 +0.001/-0.000	Ø 0.501 +0.001/-0.000
	mm	Ø 9.53 +0.03/-0.00	12.7 +0.03/0.00
M	in	6.5	11.00
	mm	165.1	279.4
N	in	2.50	4.58
	mm	63.5	116.2

Rear Flange (FT45)



	A	B	C	D	E	F	G
in	7.48	Ø 0.69	Ø 0.472 +0.001/-0.00	9.45	10.83	6.00	2.48
mm	190.0	17.5	12.00 +0.03/0.00	240.0	275.0	152.4	63.1

	H	I	J	K	L	M
in	1.99	13.9	6.26	14.55	1.00	3.05
mm	50.5	354	159.0	369.5	25.4	77.5

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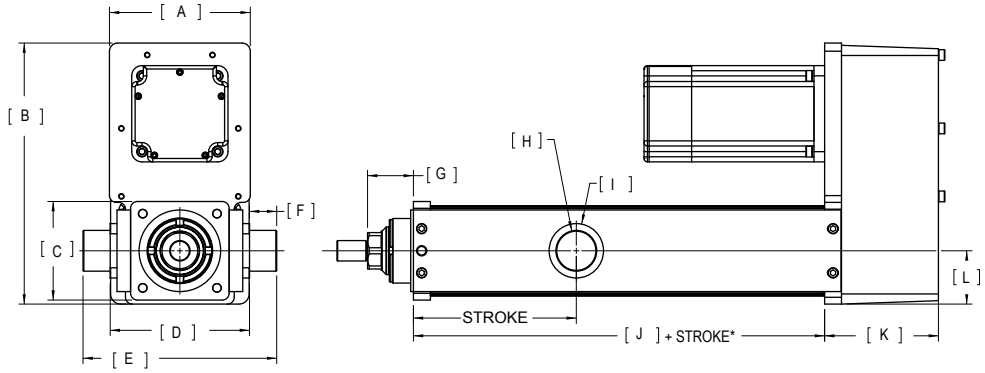
Trunnion Mount (FT35, FT60)

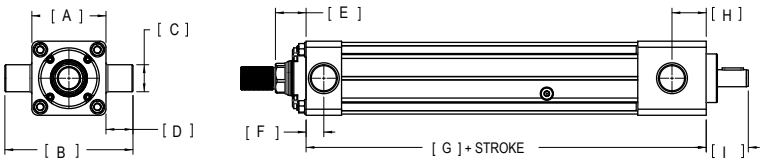


		FT35	FT60
A	in	5.18	6.82
	mm	131.6	173.2
B	in	9.60	14.32
	mm	243.8	363.7
C	in	□ 3.63	□ 6.38
	mm	92.1	161.9
D	in	5.12	8.13
	mm	130.1	206.4
E	in	7.12	12.13
	mm	180.9	308.0
F	in	1.00	2.00
	mm	25.4	50.8

		FT35	FT60
G	in	1.69	2.25
	mm	42.9	57.1
H	in	Ø 1.500** ±0.001	Ø 2.500*** ±0.001
	mm	38.1 ±0.03	63.50 ±0.03
I	in	Ø 2.00	Ø 3.50
	mm	50.8	88.9
J	in	9.1*	15.3
	mm	232*	388
K	in	4.19	4.57
	mm	106.3	116.1
L	in	1.96	3.19
	mm	49.8	81.0

*Add 20 mm if choosing high capacity option. for the FT35.
** If "Q" metric side trunnion option, Ø 35 mm h7
*** If "Q" metric side trunnion option, Ø 60 mm h9

Trunnion Mount (FT45)



		Imperial (A or 2)	Metric (V or P)
A	in	□ 4.80	□ 4.80
	mm	122.0	122.0
B	in	8.30	7.95
	mm	210.9	202.0
C	in	Ø 1.750 +0.000/-0.002	Ø 1.969 +0.000/-0.002
	mm	44.45 0.00/-0.05	50.00 0.00/-0.05
D	in	1.75	1.57
	mm	44.5	40.00
E	in	1.99	1.99
	mm	50.5	50.5

		Imperial (A or 2)	Metric (V or P)
F	in	1.15	1.15
	mm	29.2	29.2
G	in	13.9	13.9
	mm	354	354
H	in	2.22	2.22
	mm	56.4	56.4
I	in	2.73	2.73
	mm	69.3	69.3

*Front trunnion mount stroke length limited to 18 inches or less.

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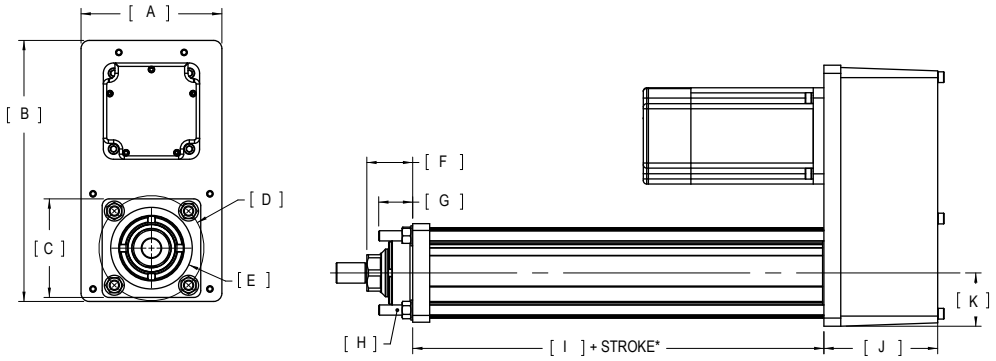
Extended Tie Rod Mount (FT35, FT60, FT80)

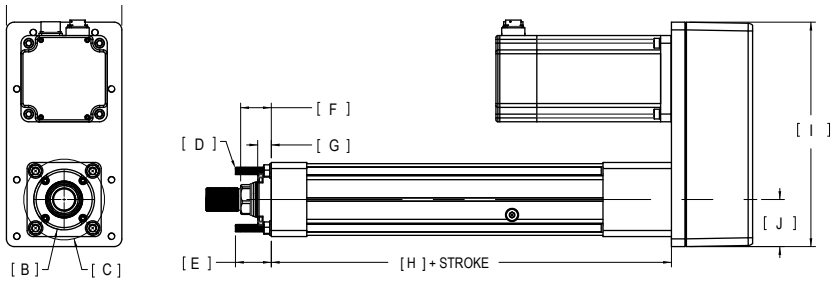


		FT35	FT60	FT80
A	in	5.18	6.82	8.77
	mm	131.6	173.2	222.8
B	in	9.60	14.32	17.33
	mm	243.8	363.7	440.2
C	in	□ 3.63	□ 6.38	□ 8.50
	mm	92.1	161.9	215.9
D	in	Ø 3.86 BC	Ø 6.79 BC	Ø 9.33 BC
	mm	98.0	172.4	237.0
E	in	Ø 3.000 +0.000/-0.002	Ø 5.000 +0.000/-0.002	Ø 6.75 +0.000/-0.002
	mm	76.20 0.00/-0.05	127.0 0.00/-0.05	171.45 0.00/-0.05
F	in	1.69	2.25	3.03
	mm	42.9	57.1	77.0

		FT35	FT60	FT80
G	in	1.25	2.00	3.50
	mm	31.8	50.8	88.9
H	in	3/8-16 UNC-2A	9/16-12 UNC-2A	3/4-10 UNC-2A
	mm	M8 x 1.25 6g	M14 x 2.0 6g	M20 x 2.5 6g
I	in	9.1*	15.3	19.8
	mm	232*	388	503
J	in	4.19	4.57	6.43
	mm	106.3	116.1	163.3
K	in	1.96	3.19	4.40
	mm	49.8	81.0	111.8

*Add 20 mm if choosing high capacity option for the FT35

Extended Tie Rod Mount (FT45)



	A	B	C	D	E
in	7.48	Ø 3.937	Ø 5.236 BC	1/2-13 UNC	2.3
mm	190.0	100.00	133.00	M12 x 1.75 6g	59

	F	G	H	I	J
in	1.99	0.88	13.9	14.55	3.05
mm	50.5	22.4	354	369.5	77.5

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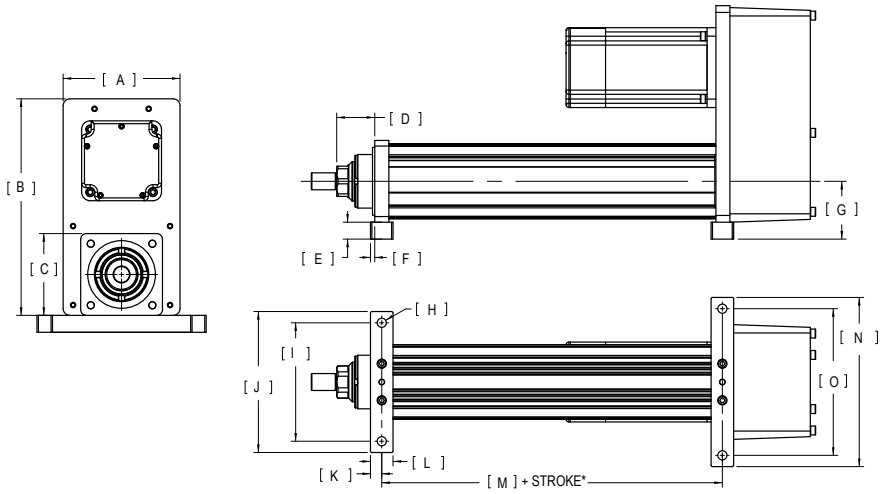
Side Lug Mount (FT35, FT60, FT80)



		FT35	FT60	FT80
A	in	5.18	6.82	8.77
	mm	131.6	173.2	222.8
B	in	9.60	14.32	17.33
	mm	243.8	363.7	440.2
C	in	□ 3.63	□ 6.38	□ 8.50
	mm	92.1	161.9	215.9
D	in	1.69	2.25	3.03
	mm	42.9	57.1	77.0
E	in	0.75	1.0	2.00
	mm	19.1	25.4	50.8
F	in	0.19	0.50	0.50
	mm	4.8	12.7	12.7
G	in	2.56	4.19	6.25
	mm	65.1	106.4	158.75

*Add 20 mm if choosing high capacity option for the FT35.

		FT35	FT60	FT80
H	in	Ø 0.41	Ø 0.53	Ø 0.78
	mm	10.3	13.5	19.8
I	in	5.25	8.50	12.75
	mm	133.4	215.9	323.9
J	in	6.25	10.00	10.75
	mm	158.8	254.0	273.1
K	in	0.50	1.00	1.25
	mm	12.7	25.4	31.8
L	in	1.00	2.00	2.50
	mm	25.4	50.8	63.5
M	in	9.1*	15.3	19.6
	mm	232*	388	498
N	in	7.50	10.00	12.75
	mm	190.5	254.0	323.9
O	in	6.5	8.50	10.75
	mm	165.1	215.9	273.1

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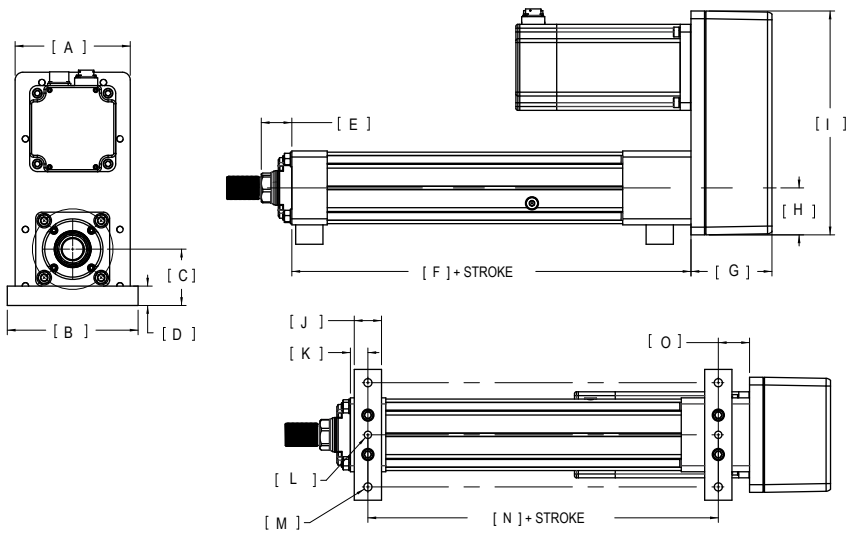
Side Lug Mount (FT45)



		FT45
A	in	7.48
	mm	190.0
B	in	8.50
	mm	215.9
C	in	3.66
	mm	93.0
D	in	1.26
	mm	32.0
E	in	1.99
	mm	50.5
F	in	13.9
	mm	354
G	in	5.26
	mm	133.6

		FT45
H	in	3.05
	mm	77.5
I	in	14.55
	mm	369.5
J	in	1.77
	mm	45.0
K	in	1.14
	mm	28.9
L	in	Ø 0.472 +0.001/0.000
	mm	12.0 +0.03/0.00
M	in	Ø 0.53
	mm	13.5
N	in	10.77
	mm	273.6
O	in	2.03
	mm	51.6

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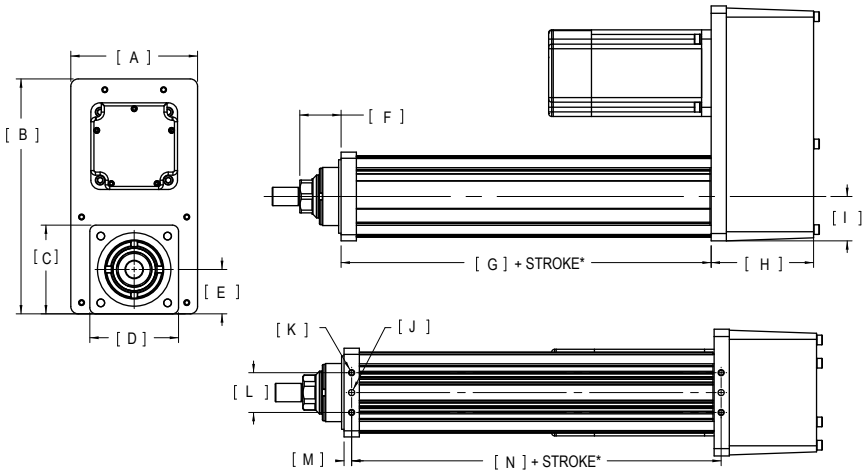
Side Mount



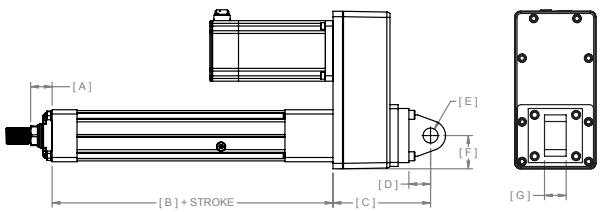
*Add 20 mm if choosing high capacity option.

		FT35	FT60	FT80
A	in	5.18	6.82	8.77
	mm	131.6	173.2	222.8
B	in	9.60	14.32	17.38
	mm	243.8	363.7	440.2
C	in	□ 3.63	□ 6.38	□ 8.50
	mm	92.1	161.9	215.9
D	in	□ 3.63	□ 6.38	□ 8.50
	mm	92.1	161.9	215.9
E	in	1.81	NA	NA
	mm	46.0	NA	NA
F	in	1.69	2.25	3.03
	mm	42.9	57.1	77.0
G	in	9.1*	15.3	19.8
	mm	232*	388	503

*Add 20 mm if choosing high capacity option for the FT35.
[1] If "J" or "K" metric side mount options, M6 x 1.0 ↧ 9 mm with Ø 6 mm M7 ↧ 9 mm dowel hole
[2] If "J" or "K" metric side mount options, M12 x 1.75 ↧ 19 mm with Ø 12 mm M7 ↧ 12 mm Dowel Hole
[3] If "J" or "K" metric side mount options, M16 x 2.0 ↧ 16 mm with Ø 12 mm M7 ↧ 12 mm dowel hole

		FT35	FT60	FT80
H	in	4.19	4.57	6.43
	mm	106.3	116.1	163.5
I	in	1.81	3.19	4.25
	mm	46.1	81.0	108.0
J		Ø 0.2500↓0.400[1] +0.0000/ -0.0005	Ø 0.5000↓1.00[2] +0.0000/ -0.0005	Ø 0.6250↓1.375[3] +0.0000/ -0.0005
K		1/4-20 UNC- 2B ↓ .63[1]	1/2-13 UNC-2B ↓ 1.13[2]	5/8-11 UNC- 2B ↓ 1.25[3]
L	in	1.63	2.50	4.00
	mm	41.3	63.5	101.6
M	in	0.31	0.50	0.75
	mm	8	12.7	19.1
N	in	9.1*	15.3	19.6
	mm	232*	388	498

Rear Eye Mount



		FT45 (Option Y)	FT45 (Option W)
A	in (mm)	1.99 (50.5)	1.99 (50.5)
B	in (mm)	13.9 (354)	13.9 (354)
C	in (mm)	9.01 (228.9)	7.90 (200.7)
D	in (mm)	2.00 (50.8)	1.26 (32.0)
E	in (mm)	1.378 ± 0.001 (35.0 ±0.03)	0.787 H9 (20.00 H9)
F	in (mm)	3.07 (77.9)	3.07 (77.9)
G	in (mm)	2.00 (50.8)	1.18 (30.0)

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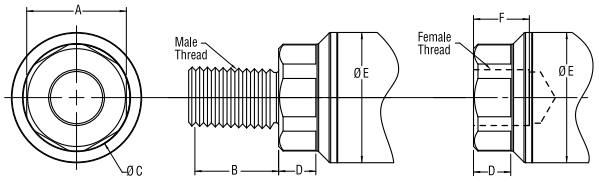
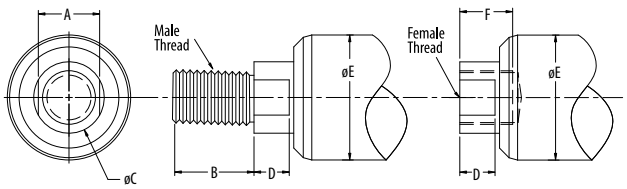
Rod Ends

FT35, FT45, FT60



FT80

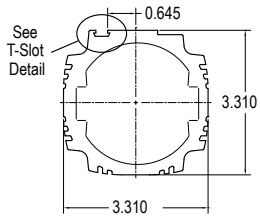


	A	B	ØC	D	ØE	F	Male U.S.	Male Metric	Female U.S.	Female Metric
FT35	1.34 (34)	1.125 (28.6)	1.434 (36.4)	0.50 (12.7)	1.750 (44.5)	0.750 (19.1)	3/4-16 UNF-2A	M16x1.5 6g	3/4-16 UNF-2B	M16x1.5 6h
FT45	1.81 (46.0)	2.25 (57.2)	2.0 (50.8)	0.63 (15.9)	2.250 (57.2)	1.50 (38.1)	1 1/2-12 UN-2A	M36x3 6g	1 1/2-12 UN-2B	M36x3 6h
FT60	2.36 (60.0)	2.750 (69.9)	2.360 (59.9)	0.750 (19.1)	3.000 (76.2)	2.000 (50.8)	1 7/8-12 UN-2A	M42x4.5 6g	1 7/8-12 UN-2B	M42x4.5 6h

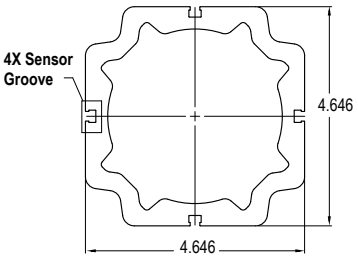
	A	B	ØC	D	ØE	F	MaleU.S.	Male Metric	Female U.S.	Female Metric
FT80	2.75 (69.9)	4.019 (102.1)	3.143 (79.8)	1.000 (25.4)	4.000 (101.6)	2.250 (57.2)	2 1/2-12 UN-2A	M56x5.5 6g	2 1/2-12 UN-2B	M56x5.5 6h

Dimensions shown in inches (mm)

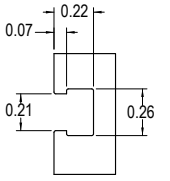
Case Dimensions



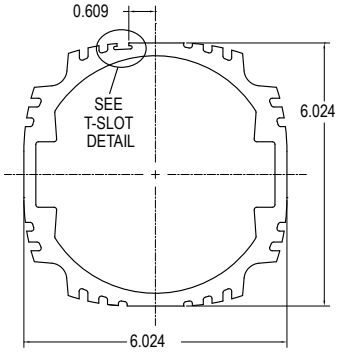
FT35



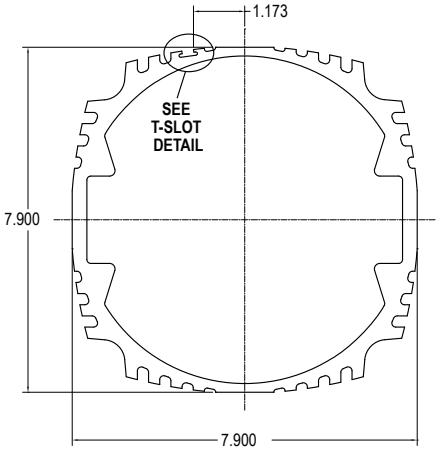
FT45



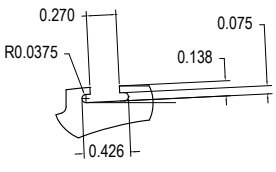
Detail 4X Sensor Groove



FT60



FT80



T-Slot Detail

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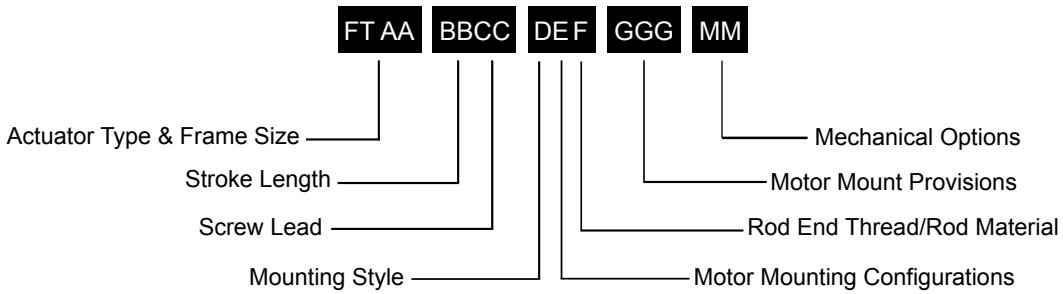
FT Series Ordering Guide



AA = FT Frame Size
35 = 3.5 inch (90 mm)
45 = 4.8 inch (122 mm)
60 = 6.0 inch (150 mm)
80 = 8.0 inch (200 mm)

BB = Stroke Length
06 = 6 inch (152 mm) FT35, FT45
12 = 12 inch (305 mm) FT35, 45, 60, 80
18 = 18 inch (457 mm) FT35, 45
24 = 24 inch (610 mm) FT35, 45, 60, 80
36 = 36 inch (914 mm) FT35, 45, 60, 80
48 = 48 inch (1219 mm) FT35, 45, 60, 80

CC = Screw Lead
05 = 0.2 inch, FT35, 45
06 = 0.23 inch, FT60, 80
10 = 0.39 inch, FT35, 45
12 = 0.47 inch, FT60, 80
20 = 0.79 inch, FT35
30 = 1.18 inch, FT60, 80

D = Mounting Style [1]
N = None
F = Front flange, English
Z = Front flange, Metric, FT45
R = Rear flange, English [4, 5]
C = Rear clevis, English [4, 5]
G = Rear clevis, Metric [4, 5]
Y = Rear eye, English [4], FT45
W = Rear eye, Metric [4], FT45
L = Side lugs
D = Double side mount, English
K = Double side mount, Metric
T = Side trunnion mount, English [5, 6] FT35, 60, 80
Q = Side trunnion mount, Metric [5, 6] FT35, 60, 80
2 = Rear trunnion mount, English, FT45
P = Rear trunnion mount, Metric, FT45
E = Extended tie rods, English
M = Extended tie rods, Metric

E = Motor Mounting Configurations [3]
N = None
I = Inline direct drive (includes Exlar standard coupling)
P = Parallel, 1:1 belt reduction
Q = Parallel, 2:1 belt reduction

F = Rod End
M = Male, US standard thread
A = Male, metric thread
F = Female, US standard thread
B = Female, metric thread
W = Male, US standard thread SS, rod end only
R = Male metric thread SS, rod end only
V = Female, US standard thread SS, rod end only
L = Female, metric thread SS, rod end only

GGG = Motor Mount Provisions [3,4]
See page 207 for Motor Mount Code.

MM = Mechanical Options [2]
XT = High capacity roller screw

Limit Switches
(adjustable position throughout stroke)
L1 = One N.O., PNP (FT35, 45, 60, 80)
L2 = Two N.C., PNP (FT35, 45, 60 80)
L3 = One N.O., PNP & Two N.C., PNP (FT35, 45, 60, 80)
L4 = One N.O., NPN (FT45)
L5 = Two N.C., NPN (FT45)
L6 = One N.O., NPN & Two N.C., NPN (FT45)

*See Page 124 for Limit Switch details

Please provide a drawing of motor dimensions with all orders to insure proper mounting compatibility.

For options or specials not listed above or for extended temperature operation, please contact Exlar

NOTES:
1. Mounting face size, shaft length and other details of particular motors may require special adapters or provisions for mounting. Always discuss your motor selection with your local sales representative.
2. For extended temperature operation consult factory for model number.
3. MAX Std. motor size: FT35: 5.6 inch/142 mm, FT45: 7.1 inch/180 mm, FT60: 7.9 inch/200 mm, FT80: 8.5 inch/215 mm
   For oversized motors, contact your local sales representative.
4. Not available with inline motor mount, contact your local sales representative.
5. Application details must be approved for use with an FT80.
6. IP65 environmental sealing option not available.

Contact your local sales representative regarding all special actuator components.

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K SERIES

MEDIUM FORCE ROLLER SCREW ACTUATOR

Mount virtually any servo motor

Long stroke lengths available

High speed and long life

Motors shown in photos are for illustrative purposes only and are not included with K Series Actuators

K Series

Linear Actuators

Exlar K Series actuators offer advanced roller screw technology in varying performance levels and allow the use of third-party motors.

A Universal Design for Ultimate Flexibility

The K Series actuator provides an ideal replacement for pneumatic and hydraulic cylinders in linear motion control applications. Unlike most suppliers who employ ballscrews, Exlar K Series linear actuators utilize a planetary roller screw, assuring long life and high resistance to shock. This feature makes Exlar actuators far superior to alternative methods for applying all-electric linear actuation in industrial and military applications.

K Series actuators are offered in 60, 75 and 90 mm frame sizes with dimensions and form-factor consistent with ISO Metric pneumatic cylinder specifications. This allows convenient substitution of Exlar actuators for existing pneumatic and hydraulic actuators.

Operating Conditions and Usage		
Efficiency:		
Motor Inline	%	80
Motor Parallel	%	80
Ambient Conditions:		
Standard Ambient Temperature	°C	0 to 65
Extended Ambient Temperature*	°C	-30 to 65
Storage Temperature	°C	-40 to 85
IP Rating		IP65S

*Consult Exlar for extended temperature operation.

Two Performance Grades to Meet Your Exact Application Needs and Budget

K Series actuators from Exlar provide a truly universal solution for linear motion rod style actuator applications. Two grades of planetary roller screws for dynamic applications are offered. These choices allow you to realize the travel life required for the application while meeting budget constraints.

KX Series actuators provides high performance planetary roller screw performance that is far superior to any other available rotary-to-linear conversion technologies. The KX Series is the ideal choice for demanding applications in industrial automation, mobile equipment, military, process control, or many other applications where millions of inches of travel under load is expected.

KM Series actuators employ a lower cost planetary roller screw design suited for applications that do not require the long life offered in the KX Series. This option still provides twice the life of similarly sized ball screw actuators along with the efficiency and shock resistance associated with roller screws.

Technical Characteristics	
Frame Sizes in (mm)	2.3 (60), 2.9 (75), 3.5 in (90)
Screw Leads in (mm)	0.19 (5), 0.4 (10)
Standard Stroke Lengths	0.7 to 48 in (20 to 1219 mm)
Force Range	up to 3,500 lbf (15 kN)
Maximum Speed	up to 32.8 in/sec (833 mm/s)

		KM60	KX60	KM75	KX75	KM90	KX90
Nominal Backlash	mm (in)	0.20 (0.008)	0.10 (0.004)	0.20 (0.008)	0.10 (0.004)	0.20 (0.008)	0.10 (0.004)
Lead Accuracy	µm/1000 mm (in/ft)	G9: 200 (0.0024)	G9: 200 (0.0024)	G9: 200 (0.0024)	G9: 200 (0.0024)	G9: 200 (0.0024)	G9: 200 (0.0024)

The Exlar Advantage

Universal Mounting Options

The K Series offers a wide variety of fixed and adjustable mounting accessories consistent with NFPA inch and ISO Metric pneumatic cylinder standards. The mounting options include:

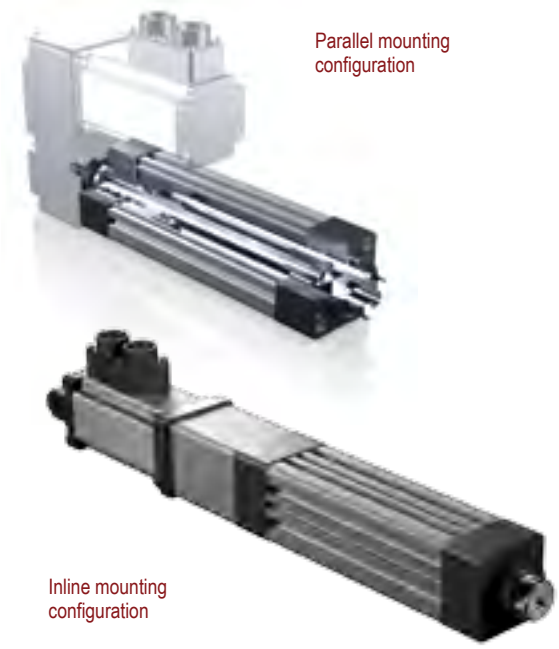
- Front Flange
- Rear Flange
- Foot Mount
- Rear Eye
- Adjustable Side Trunnions
- Rear Clevis (parallel and inline motor)
- End Angles

Standard Actuator Construction

The standard K Series actuator design includes an anodized aluminum housing offering a high level of corrosion resistance in many environments. The standard main rod is plated steel with a stainless steel rod end insert, providing excellent wear characteristics.

Sealed Body Design

The standard body design of the K Series provides an IP54S sealed housing. IP65S sealing is standard when an inline or parallel motor mount is specified. This feature allows the actuator to be used in applications where water spray is present.



Parallel mounting configuration

Inline mounting configuration

Motor Mounting Options

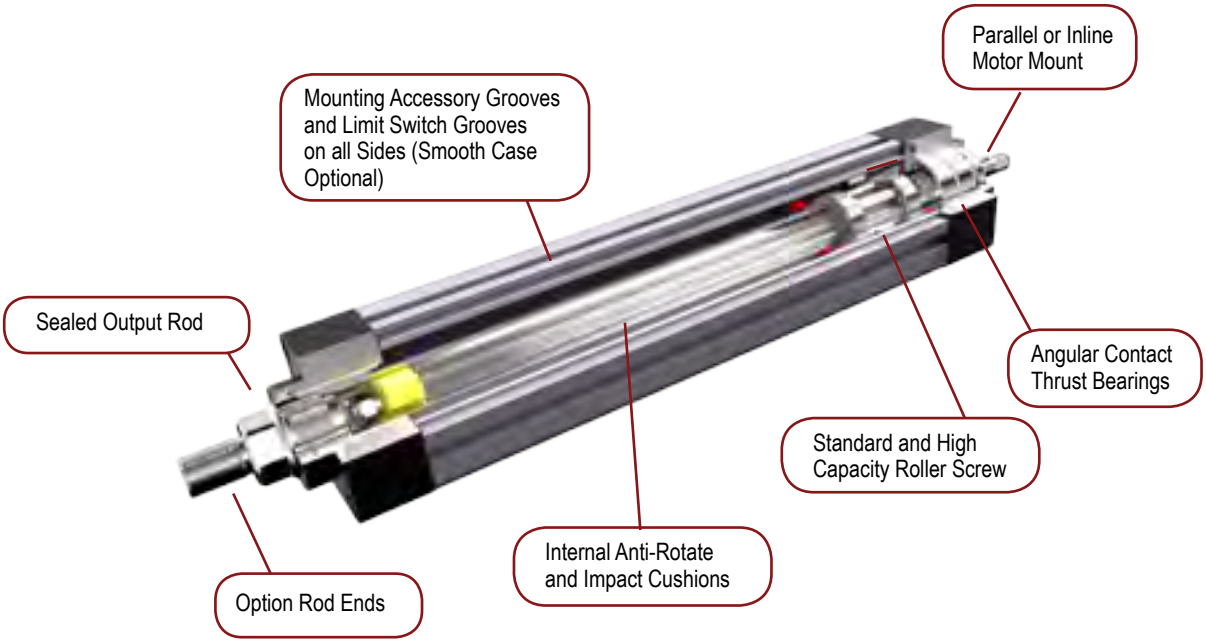
The K Series allows for complete flexibility in the type and style of motor to drive the actuator. Types of motors compatible with K Series actuators include DC motor, stepper, and servo motors. The K Series can be ordered as a base unit without motor mounting, allowing you to manufacture your own mount.

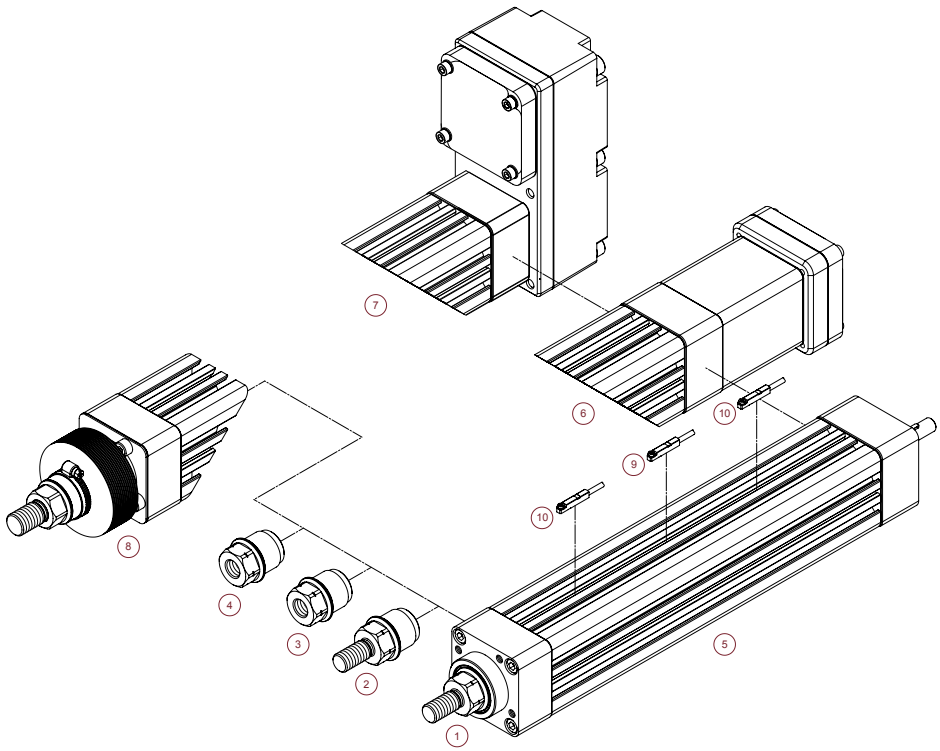
For convenience these actuators are available with preconfigured motor mounts. Exlar maintains a large library of motor mounting dimension information for most manufacturers' servos and stepper motors.

The inline mount places the motor on the input end of the actuator and allows the most compact form factor. In addition, Exlar offers a clevis mount attached to the rear of the inline-mounted motor for rear mounting.

The parallel motor mounts (side mount) utilize a belt drive system to transmit the motor torque to the actuator input shaft. Belt reductions of 1:1 and 2:1 are offered, allowing you to conveniently match the speed and output force to properly apply your K Series actuator to your specific application.

Product Features





1-Male, US Standard thread and Male, US Standard thread, SS
2-Male Metric thread and Male Metric thread, SS
3-Female US Standard thread and Female US Standard thread, SS
4-Female Metric thread and Female Metric thread, SS
5-Drive shaft only, no motor mount
6-Inline, includes shaft coupling
7-Parallel, 1:1 belt reduction-Custom Ratio, (ex. P13 = 1.3:1 belt reduction), Parallel, 1:1 belt reduction-Custom Ratio, (ex. S13 = 1.3:1 belt reduction)
8-Protective bellows for extending rod
9-External Limit Switches - N.O., PNP
10-External Limit Switches - N.C., PNP

Industries and Applications

Hydraulic cylinder replacement
Ball screw replacement
Pneumatic cylinder replacement

Automotive
- Dispensing
- Automated assembly
- Clamping

Food Processing
- Packaging machinery
- Pick and place systems

Machining
- Automated flexible fixturing
- Machine tool
- Parts clamping
- Automatic tool changers

Entertainment / Simulation
- Motion simulators
- Ride automation

Medical Equipment
- Volumetric pumps

Plastics
- Cut-offs
- Die cutters
- Molding
- Formers

Material Handling
- Indexing stages
- Product sorting
- Material cutting
- Open / close doors
- Web guidance
- Wire winding
- Pressing

Test
- Test stands

The smooth and accurate motion of Exlar's actuators combined with today's servo technology make multiple degree of freedom motion simulation applications easier to implement, cleaner and more efficient than hydraulic solutions.

DEFINITIONS:

Maximum Force: Calculated Cubic Mean Load for the application should not exceed this value. (Values are derived from the design capacity of the FT Series actuator and should not be exceeded or relied upon for continuous operation.)

Life at Maximum Force: Estimated life that can be expected from the actuator when running at Maximum Force for intermittent periods of time. (Theoretical calculation based on the Dynamic Load Rating of the actuator and using the Maximum Force rating as the Cubic Mean Load.)

C_a (Dynamic Load Rating): A design constant used when calculating the estimated travel life of the roller screw.

Maximum Input Torque: The torque required at the screw to produce the Maximum Force rating. Exceeding this value can cause permanent damage to the actuator.

Maximum Rated RPM: The maximum allowable rotational screw speed determined by either screw length limitations or the rotational speed limit of the roller screw nut.

Maximum Linear Speed: The linear speed achieved by the actuator when Maximum Rated RPM is applied to the roller screw input shaft.

Mechanical Specifications

K60

Models		KX		KM	
		05	10	05	10
Screw Lead	in	0.1969	0.3937	0.1969	0.3937
	mm	5	10	5	10
Maximum Force[3]	lbf	1350	675	1350	675
	N	6.0	3.0	6.0	3.0
Life at Maximum Force[1]	in x 10^6	1.6	18.2	0.4	4.5
	km	41.7	461.4	10.4	115.3
C_a (Dynamic Load Rating)	lbf	2738	2421	1725	1525
	N	12.2	10.8	7.7	6.8
Maximum Input Torque[2]	lbf-in	53	53	53	53
	Nm	6	6	6	6
Max Rated RPM @ Input Shaft	RPM	5000	5000	5000	5000
Maximum Linear Speed @ Maximum Rated RPM	in/sec	16.4	32.8	16.4	32.8
	mm/sec	417	833	417	833

1. See page 147 for life calculation information.
2. Input torque should be limited such that Max Force is not exceeded. For a parallel belt ratio, the input torque ratings must be divided by the belt ratio for allowable motor torque. The output force ratings remain the same.
3. Maximum allowable actuator–generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For maximum allowable externally-applied axial forces, consult factory. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight (Zero Stroke)	lb	1.7
	kg	3.7
Actuator Weight Adder (Per mm of Stroke)	lb	0.008
	kg	0.017

Adder for Inline (excluding motor)	0.42 (0.93)
Adder for Parallel Drive (excluding motor)	0.73 (1.6)
Adder for Front Flange	0.42 (0.93)
Adder for Rear Flange	2.16 (4.79)
Adder for Rear Clevis	0.44 (0.98)
Adder for Rear Eye	0.30 (0.67)
Adder for Front/Rear Angle Mounts	0.24 (0.54)
Adder for Two Trunnions	0.37 (0.82)
Adder for Two Foot Mounts	0.45 (1)

K60 Inertias kg-m2 (lbf-in-sec2)

	5 mm Lead	Add per 25 mm, 5 mm Lead
Base Unit - Input Drive Shaft Only	1.480×10^{-5} (1.31×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
Inline Unit - w/Motor Coupling	2.702×10^{-5} (2.39×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
Base Unit - Input Drive Shaft Only	1.616×10^{-5} (1.43×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
Inline Unit - w/Motor Coupling	2.837×10^{-5} (2.51×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
Parallel Drive Inertias (P10 Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (66 mm)	4.339×10^{-5} (3.84×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
1:1 Reduction Parallel Belt Drive (86 mm)	7.378×10^{-5} (6.53×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
1:1 Reduction Parallel Belt Drive (96 mm)	8.564×10^{-5} (7.58×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
2:1 Reduction Parallel Belt Drive (96 mm)	7.095×10^{-5} (6.28×10^{-4})	2.555×10^{-7} (2.261×1^{-6})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (66 mm)	4.474×10^{-5} (3.96×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
1:1 Reduction Parallel Belt Drive (86 mm)	7.514×10^{-5} (6.65×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
1:1 Reduction Parallel Belt Drive (96 mm)	8.704×10^{-5} (7.70×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
2:1 Reduction Parallel Belt Drive (96 mm)	1.966×10^{-5} (1.74×10^{-4})	2.931×10^{-7} (2.595×10^{-6})
Parallel Drive Inertias (Smooth Motor Shaft Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (66 mm)	6.015×10^{-5} (5.32×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
1:1 Reduction Parallel Belt Drive (86 mm)	1.103×10^{-4} (9.76×10^{-4})	1.022×10^{-6} (9.045×10^{-6})
1:1 Reduction Parallel Belt Drive (96 mm)	2.176×10^{-4} (1.93×10^{-3})	1.022×10^{-6} (9.045×10^{-6})
2:1 Reduction Parallel Belt Drive (96 mm)	8.768×10^{-5} (7.76×10^{-4})	2.555×10^{-7} (2.261×10^{-6})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (66 mm)	6.150×10^{-5} (5.44×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
1:1 Reduction Parallel Belt Drive (86 mm)	1.117×10^{-4} (9.88×10^{-4})	1.173×10^{-6} (1.038×10^{-5})
1:1 Reduction Parallel Belt Drive (96 mm)	2.190×10^{-4} (1.94×10^{-3})	1.173×10^{-6} (1.038×10^{-5})
2:1 Reduction Parallel Belt Drive (96 mm)	8.802×10^{-5} (7.79×10^{-4})	2.931×10^{-7} (2.595×10^{-6})

*See definitions on page 143

K75

Models		KX		KM	
		05	10	05	10
Screw Lead	in	0.1969	0.3937	0.1969	0.3937
	mm	5	10	5	10
Maximum Force[3]	lbf	2500	1250	2500	1250
	N	11.1	5.6	11.1	5.6
Life at Maximum Force[1]	in x 10^6	2.4	22.6	0.6	5.6
	km	60.7	573.3	15.2	143.5
C_a (Dynamic Load Rating)	lbf	5746	4820	3620	3036
	N	25.6	21.4	16.1	13.5
Maximum Input Torque[2]	lbf-in	98	98	98	98
	Nm	11	11	11	11
Max Rated RPM @ Input Shaft	RPM	4000	4000	4000	4000
Maximum Linear Speed @ Maximum Rated RPM	in/sec	13.1	26.2	13.1	26.2
	mm/sec	333	666	333	666

1. See page 147 for life calculation information.
2. Input torque should be limited such that Max Force is not exceeded. For a parallel belt ratio, the input torque ratings must be divided by the belt ratio for allowable motor torque. The output force ratings remain the same.
3. Maximum allowable actuator–generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For maximum allowable externally-applied axial forces, consult factory. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight (Zero Stroke)	lb	3.06
	kg	6.75
Actuator Weight Adder (Per mm of Stroke)	lb	0.0107
	kg	0.0235

Adder for Inline (excluding motor)	1.12 (2.46)
Adder for Parallel Drive (excluding motor)	1.84 (4.06)
Adder for Front Flange	0.87 (1.91)
Adder for Rear Flange	1.13 (2.49)
Adder for Rear Clevis	0.84 (1.85)
Adder for Rear Eye	0.84 (1.85)
Adder for Front/Rear Angle Mounts	0.62 (1.37)
Adder for Two Trunnions	0.71 (1.56)
Adder for Two Foot Mounts	1.12 (2.47)

K75 Inertias kg-m2 (lbf-in-sec2)

	5 mm Lead	Add per 25 mm, 5 mm Lead
Base Unit - Input Drive Shaft Only	9.26×10^{-5} (8.20×10^{-4})	3.13×10^{-6} (2.77×10^{-5})
Inline Unit - w/Motor Coupling	1.25×10^{-4} (1.11×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
Base Unit - Input Drive Shaft Only	9.48×10^{-5} (8.39×10^{-4})	3.32×10^{-6} (2.94×10^{-5})
Inline Unit - w/Motor Coupling	1.44×10^{-4} (1.28×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
Parallel Drive Inertias (P10 Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (86 mm)	2.29×10^{-4} (2.03×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
1:1 Reduction Parallel Belt Drive (96 mm)	3.19×10^{-4} (2.82×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	5.96×10^{-4} (5.28×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	2.82×10^{-4} (2.50×10^{-3})	7.83×10^{-7} (6.93×10^{-6})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (86 mm)	2.31×10^{-4} (2.05×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
1:1 Reduction Parallel Belt Drive (96 mm)	3.21×10^{-4} (2.84×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	5.98×10^{-4} (5.30×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	2.83×10^{-4} (2.51×10^{-3})	8.30×10^{-7} (7.36×10^{-6})
Parallel Drive Inertias (Smooth Motor Shaft Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (86 mm)	2.84×10^{-4} (2.51×10^{-3})	3.13×10^{-6} (2.77×10^{-5}
1:1 Reduction Parallel Belt Drive (96 mm)	4.25×10^{-4} (3.76×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	7.33×10^{-4} (6.48×10^{-3})	3.13×10^{-6} (2.77×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	3.32×10^{-4} (2.94×10^{-3})	7.83×10^{-7} (6.93×10^{-6})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (86 mm)	2.86×10^{-4} (2.53×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
1:1 Reduction Parallel Belt Drive (96 mm)	4.27×10^{-4} (3.78×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	7.35×10^{-4} (6.50×10^{-3})	3.32×10^{-6} (2.94×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	3.33×10^{-4} (2.94×10^{-3})	8.30×10^{-7} (7.35×10^{-6})

*See definitions on page 143

K90

Models		KM		KX	
		05	10	05	10
Screw Lead	in	0.1969	0.3937	0.1969	0.3937
	mm	5	10	5	10
Maximum Force[3]	lbf	3500	1750	3500	1750
	N	15.6	7.8	15.6	7.8
Life at Maximum Force[1]	in x 10^6	1.8	22.6	7.1	90.4
	km	44.9	573.8	179.6	2295
C_a (Dynamic Load Rating)	lbf	7275	6750	11548	10715
	N	32.4	30.0	51.4	47.7
Maximum Input Torque[2]	lbf-in	137	137	137	137
	Nm	16	16	16	16
Max Rated RPM @ Input Shaft	RPM	3000	3000	3000	3000
Maximum Linear Speed @ Maximum Rated RPM	in/sec	9.8	19.7	9.8	19.7
	mm/sec	250	500	250	500

1. See page 147 for life calculation information.
2. Input torque should be limited such that Max Force is not exceeded. For a parallel belt ratio, the input torque ratings must be divided by the belt ratio for allowable motor torque. The output force ratings remain the same.
3. Maximum allowable actuator–generated force that can be applied routinely. Exceeding this force may result in permanent damage to the actuator. For maximum allowable externally-applied axial forces, consult factory. For high force, short stroke applications, consult factory.

Weights kg (lbs)

Base Actuator Weight (Zero Stroke)	lb	5.42
	kg	11.96
Actuator Weight Adder (Per mm of Stroke)	lb	0.016
	kg	0.0366

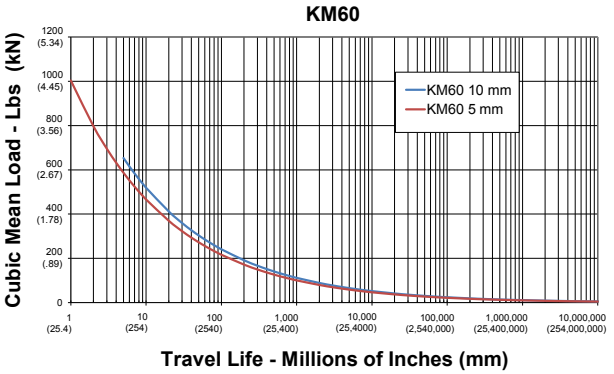
Adder for Inline (excluding motor)	1.51 (3.35)
Adder for Parallel Drive (excluding motor)	2.62 (5.80)
Adder for Front Flange	1.54 (3.40)
Adder for Rear Flange	2.86 (6.31)
Adder for Rear Clevis	1.45 (3.21)
Adder for Rear Eye	1.13 (2.49)
Adder for Front/Rear Angle Mounts	0.90 (1.97)
Adder for Two Trunnions	0.80 (1.768)
Adder for Two Foot Mounts	1.71 (3.78)

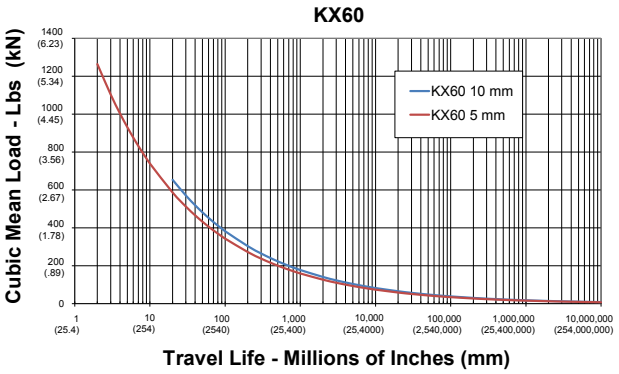
K90 Inertias kg-m2 (lbf-in-sec2)

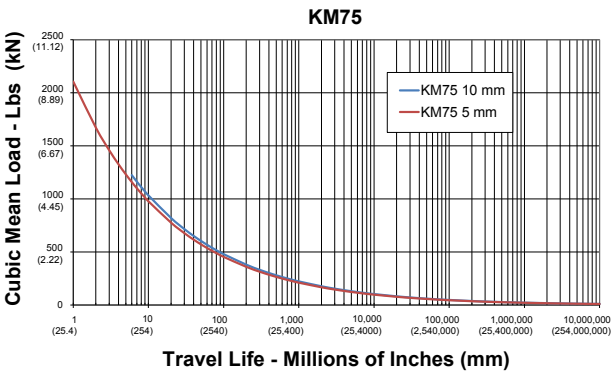
	5 mm Lead	Add per 25 mm, 5 mm Lead
Base Unit - Input Drive Shaft Only	2.97×10^{-4} (2.63×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
Inline Unit - w/Motor Coupling	3.84×10^{-4} (3.40×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
Base Unit - Input Drive Shaft Only	3.00×10^{-4} (2.66×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
Inline Unit - w/Motor Coupling	3.87×10^{-4} (3.43×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
Parallel Drive Inertias (P10 Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (96 mm)	5.12×10^{-4} (4.53×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	7.98×10^{-4} (7.07×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	3.41×10^{-4} (3.02×10^{-3})	2.77×10^{-6} (2.45×10^{-5})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (96 mm)	5.15×10^{-4} (4.56×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
1:1 Reduction Parallel Belt Drive (130 mm)	8.02×10^{-4} (7.10×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
2:1 Reduction Parallel Belt Drive (130 mm)	3.42×10^{-4} (3.03×10^{-3})	2.82×10^{-6} (2.50×10^{-5})
Parallel Drive Inertias (Smooth Motor Shaft Option)		
	5 mm Lead	**Add per 25 mm, 5 mm Lead**
1:1 Reduction Parallel Belt Drive (96 mm)	6.18×10^{-4} (5.47×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
1:1 Reduction Parallel Belt Drive (130 mm)	9.35×10^{-4} (8.27×10^{-3})	1.11×10^{-5} (9.80×10^{-5})
2:1 Reduction Parallel Belt Drive (130 mm)	3.91×10^{-4} (3.46×10^{-3})	2.77×10^{-6} (2.45×10^{-5})
	10 mm Lead	**Add per 25 mm, 10 mm Lead**
1:1 Reduction Parallel Belt Drive (96 mm)	6.21×10^{-4} (5.50×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
1:1 Reduction Parallel Belt Drive (130 mm)	9.38×10^{-4} (8.30×10^{-3})	1.13×10^{-5} (1.00×10^{-4})
2:1 Reduction Parallel Belt Drive (130 mm)	3.92×10^{-4} (3.47×10^{-3})	2.82×10^{-6} (2.50×10^{-5})

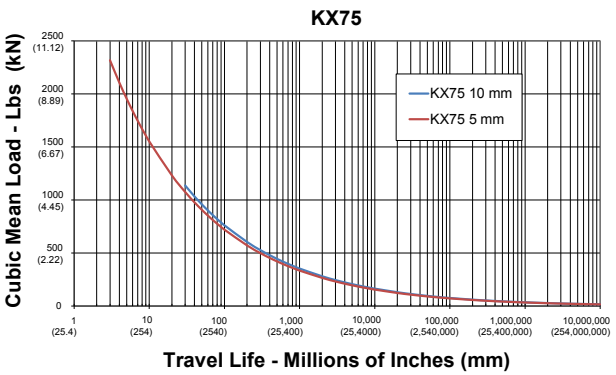
*See definitions on page 143

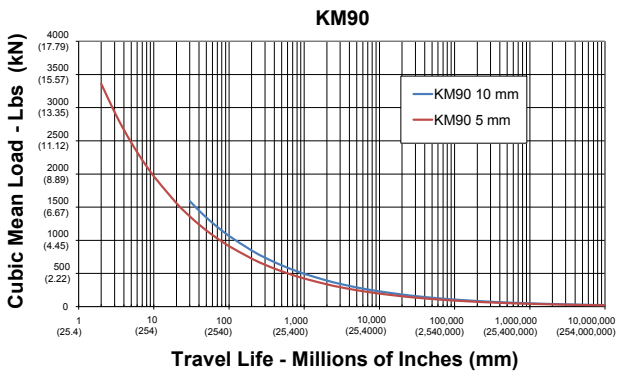
Estimated Service Life

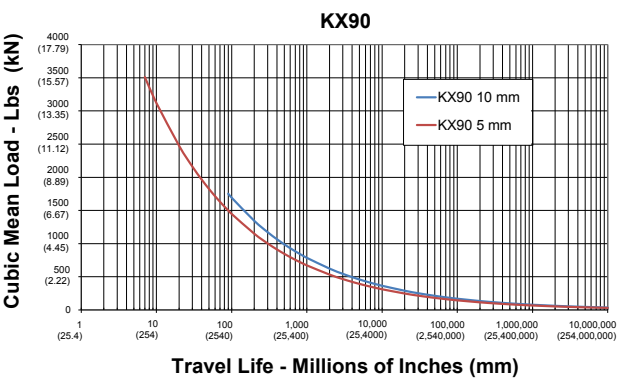












Service Life Estimate Assumptions:

- Sufficient quality and quantity of lubrication is maintained throughout service life (please refer to engineering reference on page 212 for lubrication interval estimates.)
- Bearing and screw temperature between 20° C and 40° C
- No mechanical hard stops (external or internal) or impact loads
- No external side loads
- Does not apply to short stroke, high frequency applications such as fatigue testing or short stroke, high force applications such as pressing. (For information on calculating
  estimating life for unique applications please refer to the engineering reference on page 212.

The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:
Travel life in millions of inches, where:

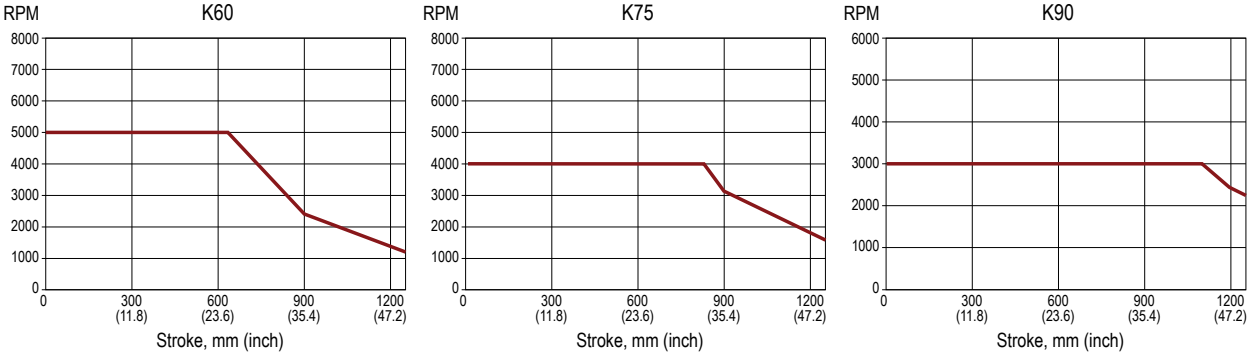
C_a = Dynamic load rating (lbf)
F_{cml} = Cubic mean applied load (lbf)
ℓ = Roller screw lead (inches)

$$L_{10} = \left(\frac{C_a}{F_{cml}} \right)^3 \times \ell$$

For additional details on calculating estimated service life, please refer to the Engineering Reference, page 212.

Data Curves

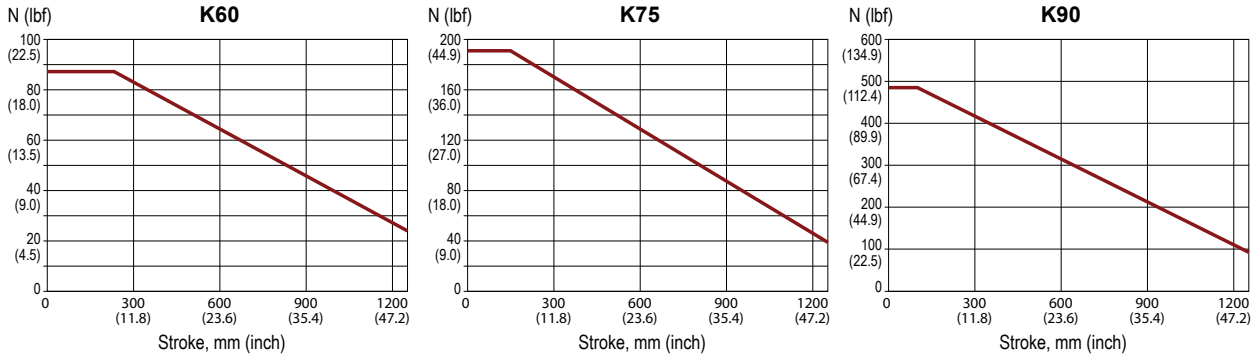
Critical Speed vs Stroke Length:



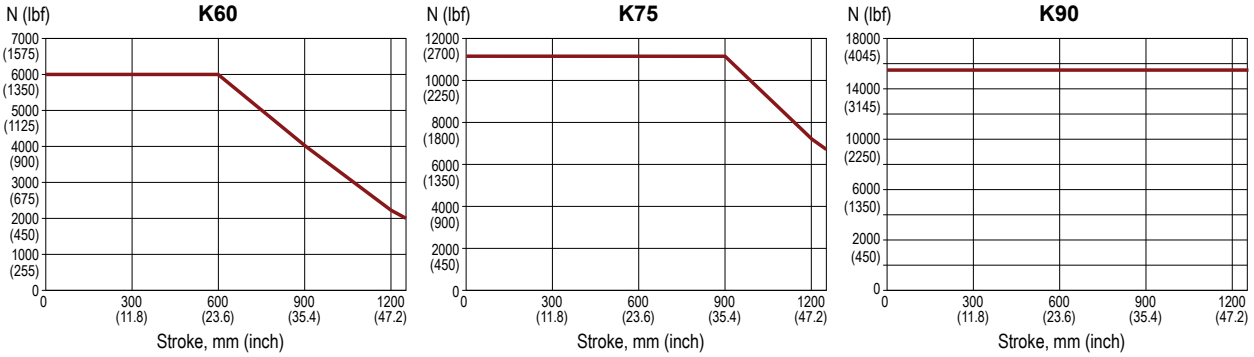
Actuator Rated Speed
speed at which we have tested and rated the actuator

* With longer stroke length actuators, the rated speed of the actuator is determined by the critical speed

Maximum Side Load:



Rated Force vs Stroke:



Options

PB = Protective Bellows

This option provides an accordion style protective bellows to protect the main actuator rod from damage due to abrasives or other contaminants in the environment in which the actuator must survive. The standard material of this bellows is S2 Neoprene Coated Nylon, Sewn Construction. This standard bellows is rated for environmental temperatures of -40 to 250 degrees F. Longer strokes may require the main rod of the actuator to be extended beyond standard length. Not available with extended tie rod mounting option. Please contact your local sales representative.

L1 ... L6 = Adjustable External Travel Switches

This option allows up to 3 external switches to be included. These switches provide travel indication to the controller and are adjustable.

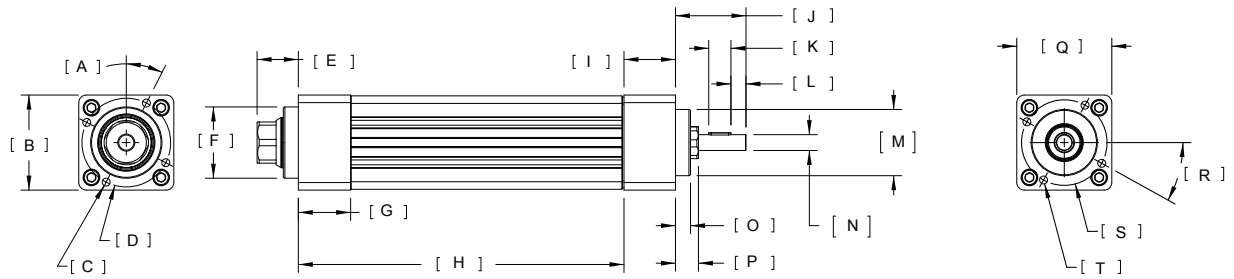
K Series Accessories

K60	K75	K90	Mounting Attachments (including proper number of standard T nuts and screws)
KSRF-60-XX	KSRF-75-XX	KSRF-90-XX	Rear Flange Attachment (see drawings and table on next page)
KSFF-60	KSFF-75	KSFF-90	Front Flange Attachment
KSEA-60	KSEA-75	KSEA-90	End Angles, Stainless Steel Std (includes 2)*
KSEP-60	KSEP-75	KSEP-90	End Angles, Parallel, Stainless Steel Std (includes 2)
KSFM-60	KSFM-75	KSFM-90	Foot Mounts (includes 2)
KSST-60	KSST-75	KSST-90	Side Trunnions (includes 2)
KSRC-60	KSRC-75	KSRC-90	Rear Clevis (includes pins)
KSRE-60	KSRE-75	KSRE-90	Rear Eye
KSMT-60	KSMT-75	KSMT-90	Metric Side Trunnion
KSMC-60	KSMC-75	KSMC-90	Metric Rear Clevis (includes pins)
KSME-60	KSME-75	KSME-90	Metric Rear Eye
K60	**K75**	**K90**	**Rod End Attachments**
SRM050	SRM075	SRM075	Front Spherical Rod Eye, fits “M” and “W” Rod only
REI050	RE075	RE075	Front Rod Eye, fits “M” and “W” Rod only
RCI050	RC075	RC075	Front Rod Clevis, fits “M” and “W” Rod only
K60	**K75**	**K90**	**Clevis Pins**
KSRP-60	KSRP-75	KSRP-90	Clevis Pin for Front and Rear Clevis, Rod Eyes and Rod Clevis
KSMP-60	KSMP-75	KSMP-90	Metric Clevis Pin for Rear Metric Clevis, Metric Rod Eyes and Rod Clevis
Limit Switches (if required in addition to L1, L2, L3 option in actuator model)			
Option	**Quantity**	**Part Number**	**Description**
L1	1	43403	Normally Open PNP Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)
L2	2	43404	Normally Closed PNP Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)
L3	1 2	43403 43404	Normally Open PNP Limit Switch (10-30 VDC, 1m, 3 wire embedded cable) Normally Closed PNP Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)
L4	1	67634	Normally Open NPN Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)
L5	2	67635	Normally Closed NPN Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)
L6	1 2	67634 67635	Normally Open NPN Limit Switch (10-30 VDC, 1m, 3 wire embedded cable) Normally Closed NPN Limit Switch (10-30 VDC, 1m, 3 wire embedded cable)

Consult your local sales representative to discuss maximum stroke length allowable with your final configuration.
Some accessories are available in stainless steel. Consult Exlar for availability and lead time.
* This option restricts max. load to 6.0 KN (1350 lbf) for K60, 8.9 KN (2000 lbf) for K75 and 9.3 KN (2100 lbf) for K90.

Dimensions

Base Actuator

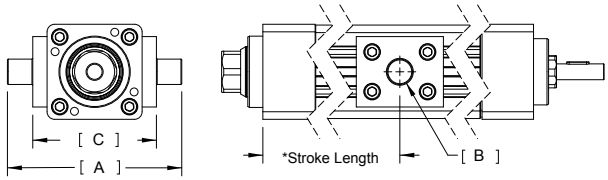


		K60	K75	K90
A		27°	28°	22.5°
B	in	□ 2.362	□ 2.953	□ 3.543
	mm	60.00	75.00	90.00
C	in	N/A	N/A	N/A
	mm	Ø M6X1.0↓16.00	Ø M8X1.25↓16.00	Ø M10X1.5↓20.00
D	in	Ø 2.205 BC	Ø 2.677 BC	Ø 3.071 BC
	mm	56.00	68.00	78.00
E	in	1.025	1.300	1.611
	mm	26.04	33.03	40.91
F	in	Ø 1.77 +0.00/-0.03	Ø 2.05 +0.00/-0.03	Ø 2.44 +0.00/-0.03
	mm	Ø 45.00 +0.00/-0.01	Ø 52.00 +0.00/-0.01	Ø 62.00 +0.00/-0.01
G	in	1.299	1.457	1.693
	mm	33.00	37.00	43.00
H*	in	4.185	5.256	6.179
	mm	106.30	133.49	156.97
I	in	1.280	1.594	1.831
	mm	32.50	40.50	46.50
J	in	1.752	2.041	2.251
	mm	44.50	51.85	57.17

*Add stroke length to dimension

		K60	K75	K90
K	in	0.551	0.760	0.787
	mm	14.00	19.31	20.00
L	in	0.374	0.591	0.728
	mm	9.50	15.00	18.50
M	in	Ø 1.646 +0.00/-0.05	Ø 2.045 +0.00/-0.05	Ø 2.440 +0.00/-0.05
	mm	41.81 +0.00/-0.02	Ø 51.94 +0.00/-0.05	Ø 62.00 +0.00/-0.05
N	in	Ø 0.394 +0.00/-0.03	Ø 0.472 +0.00/-0.03	Ø 0.629 +0.00/-0.03
	mm	10.00 +0.00/-0.01	Ø 12.00 +0.00/-0.01	Ø 16.00 +0.00/-0.01
O	in	0.374	0.472	0.472
	mm	9.50	12.00	12.00
P	in	0.571	0.691	0.681
	mm	14.50	17.54	17.29
Q	in	□ 2.362	□ 2.953	□ 3.543
	mm	60.00	75.00	90.00
R		29°	28°	22.5°
S	in	Ø 2.126 BC	Ø 2.677 BC	Ø 3.071 BC
	mm	54.00	68.00	78.00
T	in	N/A	N/A	N/A
	mm	Ø M6X1.0↓16.00	Ø M8X1.25↓21.50	Ø M10X1.5↓20.00

Trunnion Mount



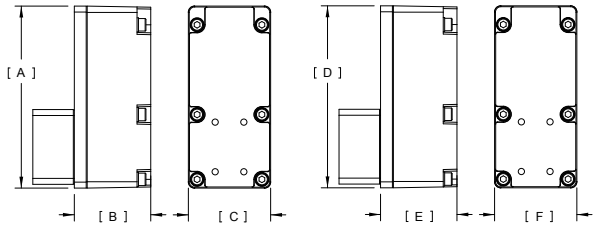
* Note: Approximate Distance for shipping. May be re-positioned by customer per application.

Version	A	øB	C
KSST-60	4.928 in	1.000 +/- .001 in	78.05 in
KSMT-60	106.88 mm	16.00 -.03 mm/-.07 mm	3.073 mm
KSST-75	5.913 in	.999 + .000/- .002 in	99.40 in
KSMT-75	150.20 mm	19.97 +.00 mm/-.05 mm	3.913 mm
KSST-90	6.504 in	.999 + .000/- .002 in	114.40 in
KSMT-90	114.40 mm	19.97 +.00 mm/-.05 mm	4.504 mm

Mounting Accessories Ordered Separately

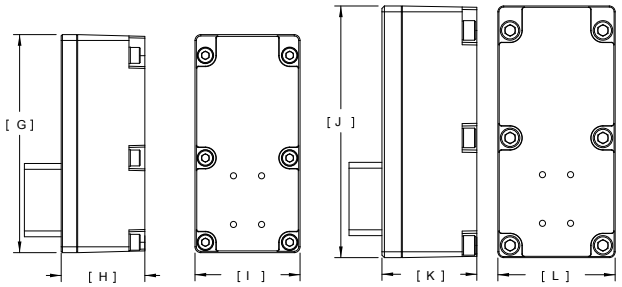
Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Parallel Mount (PXX or SXX)



66 mm wide housing

86 mm wide housing



96 mm wide housing

130 mm wide housing

		DIM	K60	K75	K90
A	in	5.748	X		
	mm	146.00	X		
B	in	2.414	X		
	mm	61.31	X		
C	in	2.598	X		
	mm	66.00	X		
D	in	7.028	X	X	
	mm	178.50	X	X	
E	in	2.696	X	X	
	mm	68.49	X	X	
F	in	3.386	X	X	
	mm	86.00	X	X	

		DIM	K60	K75	K90
G	in	8.110	X	X	X
	mm	206.00	X	X	X
H	in	3.058	X	X	X
	mm	77.66	X	X	X
I	in	3.780	X	X	X
	mm	96.00	X	X	X
J	in	10.827		X	X
	mm	275.00		X	X
K	in	3.616		X	X
	mm	91.84		X	X
L	in	5.118		X	X
	mm	130.00		X	X

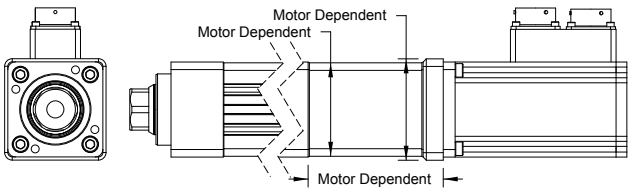
Parallel Mount Housing Width and Rear Flange/Clevis Mount Options

When selecting a parallel mount for your K Series actuator, the table at right indicates what size drive housing will be mounted to your actuator. If your application also requires a rear flange, rear clevis or rear eye, please select the appropriate attachment based on the size of the drive housing.

Actuator Frame Size	Mounted Motor Frame Size[1]	Belt Reduction Ratio[2]	Parallel Drive Housing Width[3]	Optional Rear Flange	Optional Rear Clevis	Optional Rear Eye
K60	60 mm, N23	1:1	66 mm	KSRF-60-66	KSRC-60 (English/ KSMC-60 (Metric)	KSRE-60 (English)/ KSME-60 (Metric)
	60 mm, N23	2:1	96 mm	KSRF-60-86		
	60 mm, N34	1:1 or 2:1	96 mm	KSRF-60-96		
K75	60 mm, N23	1:1	86 mm	KSRF-75-86	KSRC-75 (English)/ KSMC-75 (Metric)	KSRE-75 (English)/ KSME-75 (Metric)
	90 mm, N34	1:1	96 mm	KSRF-75-96		
	75 mm, N34	2:1	130 mm	KSRF-75-130		
	115 mm	1:1	130 mm	KSRF-75-130		
K90	60 or 90 mm	1:1	96 mm	KSRF-90-96	KSRC-90 (English/ KSMC-90 (Metric)	KSRE-90 (English)/ KSME-90 (Metric)
	60 mm, N23	1:1 or 2:1	96 mm	KSRF-90-96		
	90 mm, N34	1:1 or 2:1	130 mm	KSRF-90-130		
	115 mm	1:1	130 mm	KSRF-90-130		

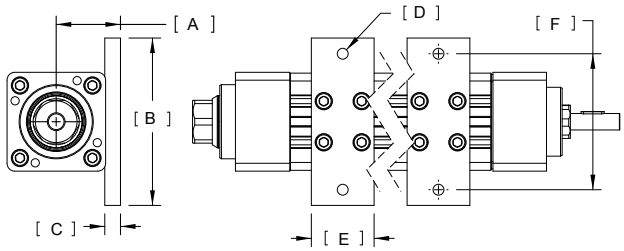
[1] Motor sizes above are based on Exlar's product offering. Other manufacturers' motors of comparable size may also be mounted.
[2] Consult Exlar for special belt reduction ratios.
[3] See drawings for parallel drive housing dimensions.

Inline Integrated Coupling



ISC keyed motor shaft recommended for inline mount

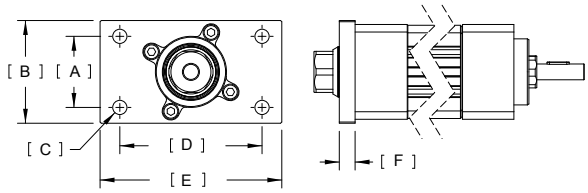
Foot Mount



Mounting position shown for dimensions only.
Feet may be positioned on any side, at any distance.

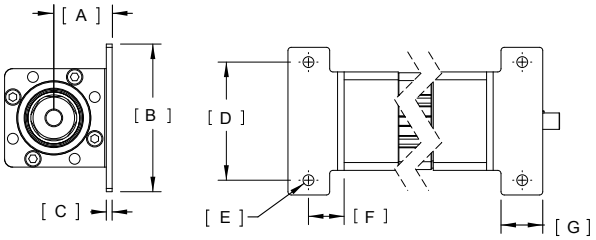
		KSFM-60	KSFM-75	KSFM-90
A	in	1.536	1.969	2.502
	mm	39.03	50.00	63.55
B	in	4.0	4.921	5.669
	mm	101.6	125.00	144.00
C	in	0.375	0.512	0.750
	mm	9.53	13.00	19.05
D	in	Ø 0.260	Ø 0.354	Ø 0.433
	mm	6.60	9.00	11.00
E	in	1.50	1.969	1.750
	mm	38.10	50.00	44.45
F	in	3.250	3.937	4.724
	mm	82.55	100.00	120.0

Front Flange



		KSFF-60	KSFF-75	KSFF-90
A	in	1.772	1.969	2.480
	mm	45.00	50.00	63.00
B	in	2.559	3.150	3.780
	mm	65.00	80.00	96.00
C	in	Ø 0.354	Ø 0.354	Ø 0.480
	mm	9.00	9.00	12.20
D	in	3.543	3.937	4.961
	mm	90.00	100.00	126.00
E	in	4.528	5.118	6.496
	mm	115.00	130.00	165.00
F	in	0.394	0.591	0.750
	mm	10.00	15.00	19.05

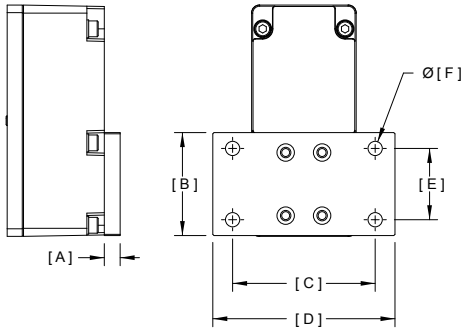
End Angles



K60 Maximum Allowable Actuator Force = 1350 lbs
K75 Maximum Allowable Actuator Force = 2000 lbs
K90 Maximum Allowable Actuator Force = 1350 lbs

	Inline	KSEA-60	KSEA-75	KSEA-90
	Parallel	KSEP-60	KSEP-75	KSEP-90
A	in	1.400	1.968	2.219
	mm	35.55	50.00	56.35
B	in	3.543	2.953	3.543
	mm	90.00	75.00	90.00
C	in	0.140	0.250	0.250
	mm	3.56	6.35	6.35
D	in	2.835	1.969	2.480
	mm	72.00	50.00	63.00
E	in	Ø 0.260	Ø 0.354	Ø 0.472
	mm	6.60	9.00	12.00
F	in	0.856	1.083	1.319
	mm	21.74	27.50	33.50
G	in	1.001	1.575	1.969
	mm	25.44	40.00	50.00

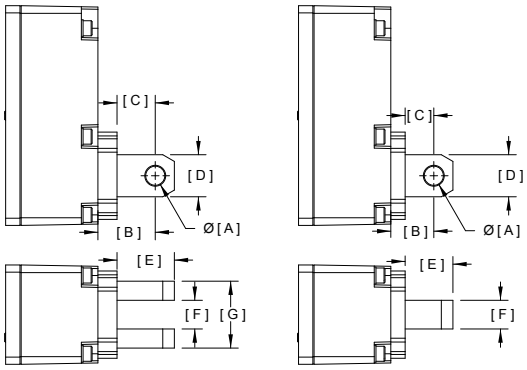
Rear Flange



Option	A	B	C	D	E	F
KSRF-60-66	0.394 in 10.00 mm	2.559 in 65.00 mm	3.543 in 90.00 mm	4.528 in 115.00 mm	1.772 in 45.00 mm	0.354 in 9.00 mm
KSRF-60-86	0.472 in 12.00 mm	2.950 in 75.00 mm	3.937 in 100.00 mm	4.724 in 120.00 mm	1.969 in 50.00 mm	0.354 in 9.00 mm
KSRF-60-96	0.750 in 19.05 mm	3.780 in 96.00 mm	4.961 in 126.00 mm	6.496 in 165.00 mm	2.480 in 63.00 mm	0.480 in 12.2 mm
KSRF-75-86	0.590 in 15.00 mm	3.150 in 80.00 mm	3.937 in 100.00 mm	5.118 in 130.00 mm	1.969 in 50.00 mm	0.354 in 9.00 mm
KSRF-75-96	0.750 in 19.05 mm	3.780 in 96.00 mm	4.961 in 126.00 mm	6.496 in 165.00 mm	2.480 in 63.00 mm	0.480 in 12.20 mm
KSRF-75-130	0.750 in 19.05 mm	4.370 in 111.00 mm	5.906 in 150.00 mm	7.323 in 186.00 mm	2.953 in 75.00 mm	0.561 in 14.25 mm
KSRF-90-96	0.750 in 19.05 mm	3.780 in 96.00 mm	4.961 in 126.00 mm	6.496 in 165.00 mm	2.480 in 63.00 mm	0.480 in 12.20 mm
KSRF-90-130	0.750 in 19.05 mm	4.370 in 111.00 mm	5.906 in 150.00 mm	7.323 in 186.00 mm	2.953 in 75.00 mm	0.561 in 14.25 mm

Rear Clevis

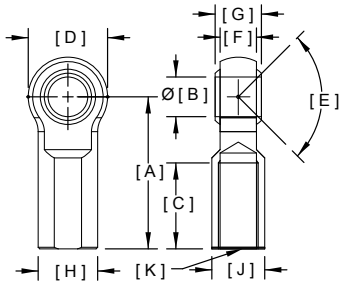
Rear Eye



Clevis and Eye Dimesions, Imperial and Metric

Option	A	B	C	D	E	F	G
Inch Clevis (KSRC-60)	0.500 in +0.004/+0.002	1.500 in	1.000 in	1.100 in	1.500 in	0.750 in +0.020/-0.000	1.750 in +0.000/-0.029
Metric Clevis (KSMC-60)	12 mm +0.04/-0.0	25.00 mm	16.00 mm	24.00 mm	28.00 mm	28.00 mm +0.52/-0.00	52.00 +0.00/-0.74 mm
Inch Eye (KSRE-60)	0.500 in +0.004/+0.002	1.125 in	0.750 in	1.100 in	1.250 in	0.750 in +0.008/-0.024	NA
Metric Eye (KSME-60)	12 mm +0.04/-0.0	25.00 mm	16.00 mm	24.00 mm	28.00 mm	28.00 mm +0.20/-0.60	NA
Inch Clevis (KSRC-75)	0.751 in +0.001/+0.000	2.000 in	1.375 in	1.250 in	2.000 in	1.251 in +0.005/-0.001	2.500 in
Metric Clevis (KSMC-75)	16 mm +0.04 mm/-0.0	36.00 mm	20.00 mm	30.00 mm	40.00 mm	40.00 +0.41/-0.00 mm	70.00 mm
Inch Eye (KSRE-75)	0.751 in +0.001/+0.000	2.000 in	1.375 in	1.250 in	2.000 in	1.250 in +0.000/-0.005	NA
Metric Eye (KSME-75)	16 mm +0.04 mm/-0.0	36.00 mm	20.00 mm	30.00 mm	34.00 mm	39.80 -0.20/-0.60 mm	NA
Inch Clevis (KSRC-90)	0.750 in +0.001/+0.000	2.000 in	1.375 in	1.450 in	2.100 in	1.251 in +0.005/-0.001	3.544 in
Metric Clevis (KSMC-90)	16 mm +0.04 mm/-0.0	36.00 mm	20.00 mm	36.00 mm	37.00 mm	50.00 +0.41/-0.00 mm	90.00 mm
Inch Eye (KSRE-90)	0.750 in +0.001/+0.000	2.000 in	1.375 in	1.450 in	2.100 in	1.250 in +0.000/-0.005	NA
Metric Eye (KSME-90)	16 mm +0.04 mm/-0.0	36.00 mm	20.00 mm	36.00 mm	37.00 mm	50.00 -0.20/-0.60 mm	NA

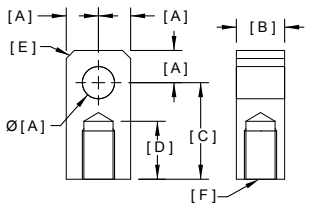
Spherical Rod Eye



	K60 (SRM050)	K75 (SRM075)	K90 (SRM075)
A	2.125 in (54.0 mm)	2.875 in (73.03 mm)	2.875 in (73.03 mm)
Ø B	0.500 in (12.7 mm)	0.750 in (19.05 mm)	0.750 in (19.05 mm)
C	1.156 in (29.4 mm)	1.625 in (41.28 mm)	1.625 in (41.28 mm)
D	1.312 in (33.3 mm)	1.75 in (44.5 mm)	1.75 in (44.5 mm)
E	6°	14°	14°
F	0.500 in (12.7 mm)	0.688 in (17.46 mm)	0.688 in (17.46 mm)
G	0.625 in (15.9 mm)	0.875 in (22.23 mm)	0.875 in (22.23 mm)
H	0.875 in (22.2 mm)	1.125 in (28.58 mm)	1.125 in (28.58 mm)
J	0.750 in (19.1 mm)	1.000 in (25.40 mm)	1.000 in (25.40 mm)
K	1/2-20	3/4-16	3/4-16

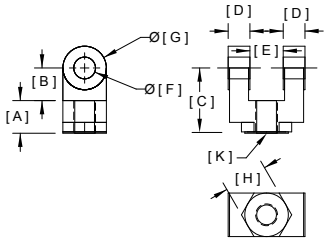
Pre-sale drawings and models are representative and are subject to change. Certified drawings and models are available for a fee. Consult your local Exlar representative for details.

Rod Eye



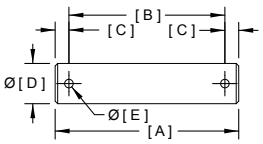
	K60 (REI050)	K75 (RE075)	K90 (RE075)
Ø A	0.50 in (12.7 mm)	0.750 in (19.05 mm)	0.750 in (19.05 mm)
B	0.75 in (19.05 mm)	1.250 in (31.75 mm)	1.250 in (31.75 mm)
C	1.50 in (38.1 mm)	2.375 in (60.33 mm)	2.375 in (60.33 mm)
D	0.75 in (19.05 mm)	1.125 in (28.58 mm)	1.125 in (28.58 mm)
E	0.375 in (9.53 mm)	3/4-16	3/4-16
F	1/2-20	NA	NA

Rod Clevis



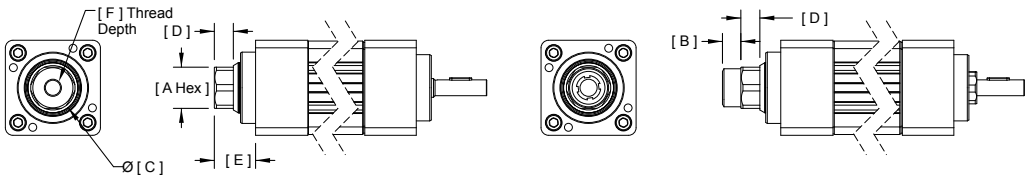
	K60 (RCI050)	K75 (RC075)	K90 (RC075)
A	0.750 in (19.05 mm)	1.125 in (28.58 mm)	1.125 in (28.58 mm)
B	0.750 in (19.05 mm)	1.250 in (31.75 mm)	1.250 in (31.75 mm)
C	1.500 in (38.1 mm)	1.750 in (44.45 mm)	1.750 in (44.45 mm)
D	0.500 in (12.7 mm)	0.625 in (15.88 mm)	0.625 in (15.88 mm)
E	0.765 in (19.43 mm)	1.265 in (32.13 mm)	1.265 in (32.13 mm)
Ø F	0.500 in (12.7 mm)	0.750 in (19.05 mm)	0.750 in (19.05 mm)
Ø G	1.000 in (25.4 mm)	1.500 in (38.10 mm)	1.500 in (38.10 mm)
H	1.000 in (25.4 mm)	1.250 in (31.75 mm)	1.250 in (31.75 mm)
Ø J	N/A	N/A	N/A
K	1/2-20	3/4-16	3/4-16

Clevis Pin

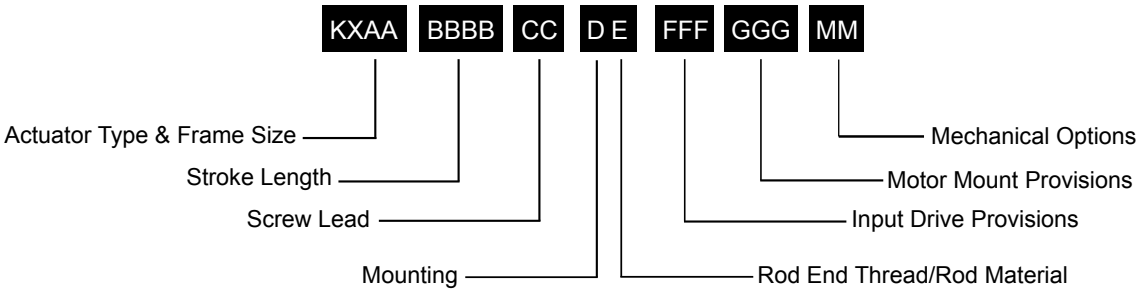


	K60		K75		K90	
	KSMP-60	CP 050	KSMP-75	KSRP-75	KSMP-90	KSRP-90
A	2.56 in (65 mm)	2.28 in (57.9 mm)	3.35 in (85.0 mm)	3.09 in (78.5 mm)	4.13 in (105.0 mm)	4.13 in (105.0 mm)
B	2.19 in (55.50 mm)	1.94 in (49.28 mm)	2.99 in (76.0 mm)	2.74 in (69.5 mm)	3.78 in (96.0 mm)	3.78 in (96 mm)
C	0.19 in (4.75 mm)	0.17 in (4.32 mm)	0.18 in (4.5 mm)	0.18 in (4.5 mm)	0.18 in (4.5 mm)	0.18 in (4.5 mm)
Ø D	0.47 in (12 mm)	0.50 in (12.7 mm)	0.630 in +0.000/-0.002 (16 mm +0.00/-0.04)	0.750 in +0.000/-0.002 (19.05 mm +0.00/-0.04)	0.630 in +0.000/-0.002 (16 mm +0.00/-0.04)	0.750 in +0.000/-0.002 (19.05 mm +0.00/-0.04)
Ø E	0.12 in (3 mm)	0.095 in (2.41 mm)	0.14 in (3.56 mm)	0.14 in (3.56 mm)	0.14 in (3.56 mm)	0.14 in (3.56 mm)

Rod Ends



	Thread	A Hex	B	ø C Rod	D	E	F
K60							
M/W	U.S. Male 1/2-20 UNF-2A	1.02 in (28.00 mm)	0.875 in (22.2 mm)	1.249 in (31.74 mm)	0.472 in (12.00 mm)	1.025 in (26.04 mm)	N/A
F/V	U.S. Female 1/2-20 UNF-2B	1.02 in (28.00 mm)	N/A	1.249 in (31.74 mm)	0.472 in (12.0 mm)	1.025 in (26.04 mm)	0.75 in (19.0 mm)
A/R	Metric Male M12 x 1.25 6g	1.02 in (28.00 mm)	0.945 in (24 mm)	1.249 in (31.74 mm)	0.472 in (12.0 mm)	1.025 in (26.04 mm)	N/A
B/L	Metric Female M12 x 1.25 6H	1.02 in (28.00 mm)	N/A	1.249 in (31.74 mm)	0.472 in (12.0 mm)	1.025 in (26.04 mm)	0.70 in (17.80 mm)
K75							
M/W	U.S. Male 3/4-16 UNF-2A	1.18 in (30.00 mm)	1.125 in (28.58 mm)	1.500 in (38.10 mm)	0.551 in (14.00 mm)	1.300 in (33.03 mm)	N/A
F/V	U.S. Female 3/4-16 UNF-2B	1.18 in (30.00 mm)	N/A	1.500 in (38.10 mm)	0.551 in (14.0 mm)	1.300 in (33.03 mm)	1.13 in (28.58 mm)
A/R	Metric Male M16 x 1.50 6g	1.18 in (30.00 mm)	1.125 in (32.00 mm)	1.500 in (38.10 mm)	0.551 in (14.0 mm)	1.300 in (33.03 mm)	N/A
B/L	Metric Female M16 x 1.50 6H	1.18 in (30.00 mm)	N/A	1.500 in (38.10 mm)	0.551 in (14.0 mm)	1.300 in (33.03 mm)	1.30 in (33.00 mm)
K90							
M/W	U.S. Male 3/4-16 UNF-2A	1.34 in (34.00 mm)	1.50 in (38.10 mm)	1.750 in (44.45 mm)	0.629 in (16.00 mm)	1.611 in (40.91 mm)	N/A
F/V	U.S. Female 3/4-16 UNF-2B	1.34 in (34.00 mm)	N/A	1.750 in (44.45 mm)	0.629 in (16.00 mm)	1.611 in (40.91 mm)	1.25 in (31.75 mm)
A/R	Metric Male M20 x 1.5 6g	1.34 in (34.00 mm)	1.417 in (36.00 mm)	1.750 in (44.45 mm)	0.629 in (16.00 mm)	1.611 in (40.91 mm)	N/A
B/L	Metric Female M20 x 1.5 6H	1.34 in (34.00 mm)	N/A	1.750 in (44.45 mm)	0.629 in (16.00 mm)	1.611 in (40.91 mm)	1.50 in (38.10 mm)



Actuator Series
KX = High Capacity Roller Screw
KM = Standard Capacity Roller Screw

AA = Actuator Frame Size
60 = 60 mm (2.375 inch)
75 = 75 mm (2.95 inch)
90 = 90 mm (3.54 inch)

BBBB = Stroke Length (mm)
0020-1225 mm

CC = Lead (linear motion per screw revolution)
05 = 5 mm (0.2 inch) roller screw only
10 = 10 mm (0.4 inch) roller screw only

D = Mounting Options
N = None, Base Unit

E = Rod Options
M = Male, US Standard thread
A = Male Metric thread
F = Female US Standard thread
B = Female Metric thread
W = Male, US Standard thread, SS [1]
R = Male Metric thread, SS [1]
V = Female US Standard thread, SS [1]
L = Female Metric thread, SS [1]

FFF = Input Drive Provisions
NMT = Drive shaft only, no motor mount
ISC = Inline, includes shaft coupling
Keyed Motor Shaft Options
P10 = Parallel, 1:1 belt reduction
P20 = Parallel, 2:1 belt reduction
Smooth Motor Shaft Options
S10 = Parallel, 1:1 belt reduction
S20 = Parallel, 2:1 belt reduction

GGG = Motor Mount Provisions [3]
See page 212 for Motor Mount Code.

MM = Mechanical Options [4]
PB = Protective bellows for extending rod

Limit Switches [2]
L1 = One N.O., PNP
L2 = Two N.C., PNP
L3 = One N.O. PNP & two N.C., PNP
L4 = One N.O., NPN
L5 = Two N.C., NPN
L6 = One N.O., NPN & two N.C., NPN

*See Page 149 for Limit Switch details.

For options or specials not listed above or for extended temperature operation, please contact Exlar

NOTES:
1. SS rod end on plated SS rod.
2. Not available with SE option.
3. For oversized motors, contact your local sales representative.
4. For extended temperature operation consult factory for model number.